China, Manchuria, Japan, Indo-China, Siam, Straits Settlements, Malay States, Burma, India, Malaysia, and the Philippines

STEEL PIER CONSTRUCTION, MANILA PORT WORKS

VOL. II: No. 3. MANILA AND SHANGHAI, AUGUST, 1905

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THE FAR-EASTERN REVIEW

ENGINEERING, COMMERCE, FINANCE.

FAR EASTERN REVIEW

COMMERCE ✪ ENGINEERING ✪ FINANCE

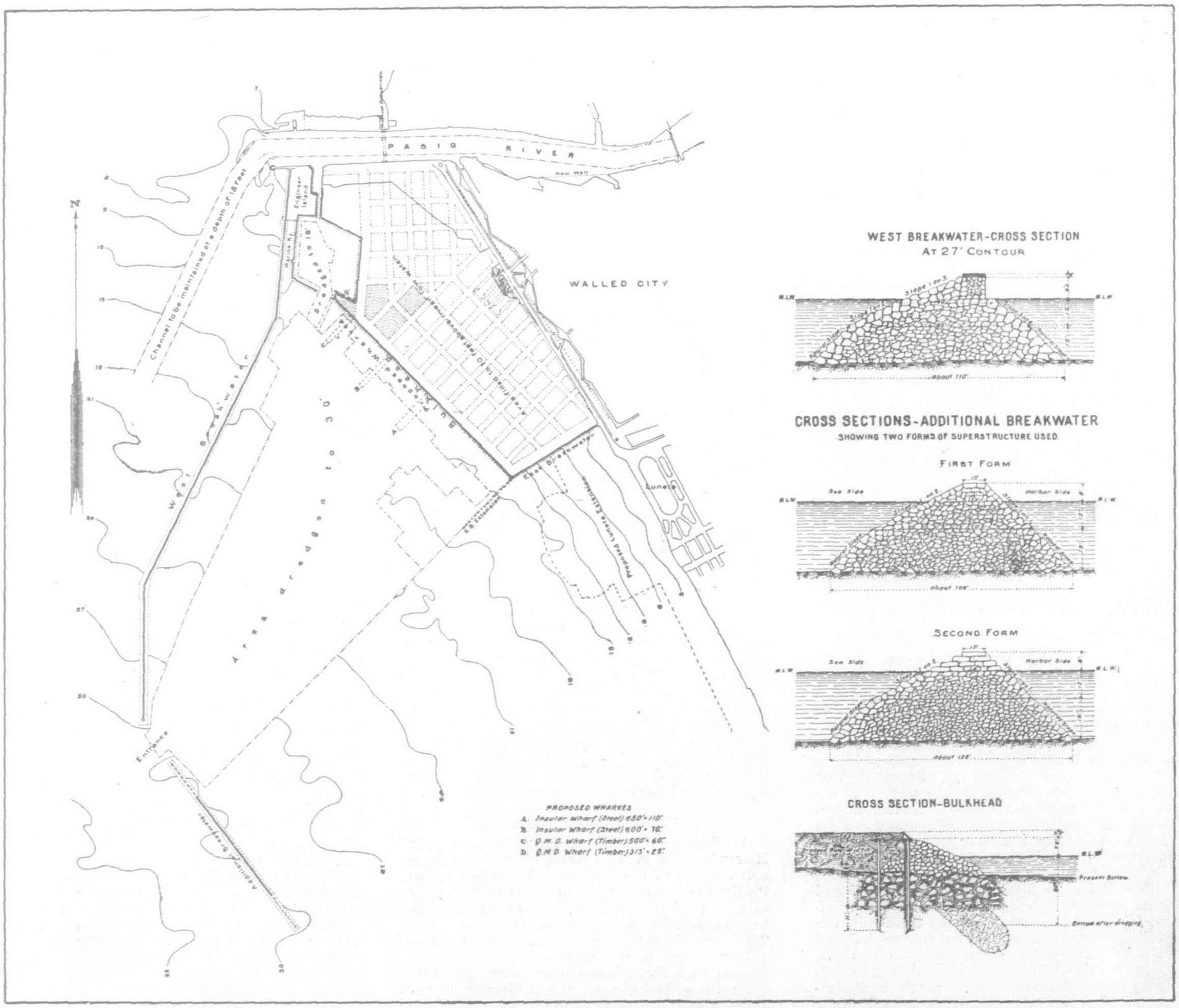
VOL. II. MANILA, P. I., AUGUST, 1905. No. 3.

STEEL PIER CONSTRUCTION, MANILA PORT WORKS

Bids are about to be advertised for by the Philippine Government for the construction of two steel piers in connection with Manila harbor improvement scheme, which has been under way for more than two years. The piers have been located with reference to future demands of shipping on port accommodations. Space has been reserved along the bulkhead of the reclaimed area abutting upon Malecon Drive for five piers in addition to those now in contemplation. Provision has also been made by the engineers for the long-talked-of Luneta extension, which is part of the Burnham plan of parking the city, and this extension will be reclaimed from the harbor by the Atlantic, Gulf and Pacific Company, in addition to which the contracting firm will cover the tract of land it already has reclaimed, with about 3 ft. more of harbor dredgings, which, when it is drained and permanently settled, will give the reclamation a surface height over the present measurement of about 2½ ft.

FUTURE PIER-SIDE BERTHING FACILITIES.—After the final dredgings have been finished the water area of the harbor improvement will have a uniform mean depth of from 30 ft. to 31 ft., which will give to practically all ships calling at this port pier-side accommodation. Even the mammoth steamer *Manchuria* will

(Continued on page 60)



MANILA PORT WORKS.—GENERAL PLAN OF HARBOR ACCORDING TO EXISTING (AMERICAN) PROJECT

FAR EASTERN REVIEW

COMMERCE :-: ENGINEERING :-: FINANCE

A MONTHLY REVIEW OF FAR EASTERN TRADE, FINANCE, AND ENGINEERING. DEDICATED TO THE INDUSTRIAL DEVELOPMENT AND ADVANCEMENT OF TRADE IN THE PHILIPPINES AND FAR EASTERN COUNTRIES.

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MANILA AND SHANGHAI, AUGUST, 1905

THE TAFT PARTY.

The Secretary of War and his distinguished party are now in the Philippine Islands, and in the intervals between dinners, banquets and other functions will be able to see a little of the country and form ideas which will serve as the basis for individual or party action the next session of Congress. Secretary Taft has fulfilled his promise to the people of the Islands, and through thick and thin has championed their cause, even when his Americanism has been doubted and challenged by the interests opposed to the fair treatment and justice for us, characterizing his campaign.

The Railroad Bill, the Insular Tariff and other measures for our benefit have been successfully passed, but the main tariff bill, the most important of all, has twice been defeated in the closing days of the last two sessions. Despite this defeat, the Administration has again declared its intention, through the Secretary of War, not to give up the struggle until absolute free trade, or a substantial reduction on our two staples, has been secured, and true to its past efforts the Opposition has determined to carry on the fight until the Philippines are relegated to growing cocoanuts and century plants.

When we remember who were our most bitter opponents in the debates on the tariff, and mainly responsible for the failure of the bill, and when we glance over the list of names comprising the party now in the Islands, we can more fully appreciate the work of the Secretary of War and the advantages which must accrue to the Islands from his selection of the personnel of the party.

There are many minor issues still pending for the development of the Philippines, but the main issue towering above all others, and the one which is first and foremost in the minds of the party, is that of the tariff. Without this boon, all other concessions are worthless. The tariff bill reduces down to a question of sugar and tobacco, and it is to be hoped and trusted that too many minor necessities will not be brought forward by over zealous interests to cloud the more important point.

It is hardly to be expected that every member of the party will depart with favorable ideas and impressions of our needs, for it is entirely logical to suppose that some of them will employ the opportunity to strengthen their argument, and complete the case which will mean a prolongation of our industrial depression. At the same time, however, there are in the party those who will view conditions from our standpoint, and offset and possibly overmatch the other element. We note that Senators Dubois and Foster, champions of the beet and cane sugar interests, are in the party, and their observations will, no doubt, be strengthened by the more practical conclusions drawn by the Hon. Emile Godchaux, one of the leading cane sugar planters in Louisiana, whose estate is a model among the factories of the world.

This one fact is evidence that the Opposition has come to study the industry at first hand, fortifying the arguments of their senatorial champions by the advice of the brightest experts in the world. This situation is one which is welcome to those having the interests of the Philippine Islands at heart, as heretofore the campaign against us has been based entirely upon contradictory information from parties having only a superficial knowledge of the industry, and from similar official reports.

As the main objective of the party is the acquisition of ideas and information bearing on the tariff, which means SUGAR, we are confident that the result of this visit will be somewhat in the nature of a surprise over the actual condition of the industry, and a more favorable tendency to do the right thing by the Islands in the future.

Mr. Godchaux will be the first to see that the industry is seventy years behind the times, and on a lower scale even than the old Muscovado estates which are still in evidence through the West Indies, and that the menace to the home beet and cane industry is a long way off. The only conclusion he can arrive at, as a sugar expert, is that we need new capital and new methods, and that this will be denied us as long as the high protective tariff is in force.

A comparison of his own magnificent estate with the best Filipino outfit will satisfy him that the art of making sugar in the Philippines is a burlesque on the industry as it stands today; but such as it is it represents the capital of many small planters, and the hope of the Islands for brighter days to come.

OUR PUBLIC LAND ACT.

A Manila subscriber to THE FAR EASTERN REVIEW, who is an earnest champion of the colonization of the agricultural districts of the Philippine Islands by Americans as the only salvation of the country, makes the following request upon this paper:—

"*Editor of* THE FAR EASTERN REVIEW:—

In view of the fact that the legislators who are now in the Islands with Secretary Taft seem to be seeking all the information possible about the country and its conditions, will you kindly publish for their information the important features of the Public Land Act? I believe this law will appeal to them as being too narrow to admit of our agricultural rejuvenation. At the banquet to Mr. Taft and his party the other night, by the combined chambers of commerce, Senator Foster of Louisiana hit the nail on the head when he said that every foot of soil in the Philippine Islands is American territory. This being the truth, should we not have land laws broad and generous enough to attract American capital and the American pioneer farmer to the land? This policy can only revive our agriculture.—(Signed) *A. J. M.*"

Under the Public Land Act, No, 926, which was proclaimed in force in the Philippine Islands July 26th, 1904, individuals, co-partnerships and corporations may purchase agricultural public lands at auction, and have five years in which to pay the purchase price.

This law, with special reference to purchase by corporations, is interesting. Agricultural public land is the only kind that may be purchased under the law. Land that contains any valuable deposits of coal, salts, or any kind of valuable mineral may not be purchased. The land must be more valuable for agricultural than for forestry, mining, or any other purpose.

The corporation must be organized under the laws of the Philippine Islands, or of the United States, or some state, territory, or insular possession of the United States. Such an organization may purchase not exceeding one thousand and twenty-four *hectares*, or about 2,500 acres, of land, and if organized to engage in agriculture must be limited by its charter to the ownership and control of not exceeding that area. It is unlawful for any member of a corporation engaged in agriculture to be in any wise interested in any other corporation engaged in agriculture, and it is also unlawful for any corporation organized for any purpose except irrigation, to be in any wise interested in any other corporation which is engaged in agriculture.

Any corporation organized in any of the American states, territories, or insular possessions, that is, any corporation organized in American jurisdiction outside of the Philippine Islands, is a foreign corporation here, and must comply with the Philippine laws governing the transaction of business in the Philippine Islands by foreign corporations. No other foreign corporation can purchase land from the state.

The Spanish Government seems never to have made any general or connected system of survey of the public domain of the Islands, and the present government has not yet undertaken such a survey. Hence, neither the extent nor the location of the public lands of the Philippines is definitely known, and no maps showing the location of such lands as are subject to sale under the law can be furnished by the government.

All lands purchased by corporations, when the tract is of more than 64 *hectares*, must be taken, wherever it is possible, in contiguous squares of not less than 64 *hectares* each. But a purchaser of one or more tracts of 64 *hectares* may also take, in connection therewith, one rectangular tract of 32 *hectares*, provided the longer side of such smaller tract is contiguous to the square tract of 64 *hectares*, or to one such 64 *hectare* tract, if more than one be purchased.

Sales will not be made of tracts of land lying in such manner as to give the purchaser control of any adjacent land, water, stream, shoreline, way, roadstead, or other valuable right, to the prejudice of the interests of the public.

A purchaser of public land is required under the law to actually occupy, cultivate, and improve the land for five years, and when the patent is issued the title is guaranteed by the government under the Torrens Land Law which is in force in the Islands.

Applications to purchase agricultural public land should be made to the Chief of the Bureau of Public Lands, Manila, and as soon as an application is approved, the sale ordered, and an appraisement made, that official will advertise for bids for the land, and then the applicant and any other qualified company may submit bids. The bidder must enclose with his sealed bid a certified check, or a post-office money order, payable to the order of the chief of the land bureau, for 65 per

cent of the amount of his bid. Any bid for less than the appraised value of the land, which may not be less than -P-10 ($5) per *hectare*, will not be considered. The land is to be awarded for purchase to the highest qualified bidder, but, if, upon opening the bids it is found that the highest price is offered by more than one bidder, and one of such tie bidders is the original applicant, then such original applicant is entitled to be awarded the land. If, however, the original applicant is not one of such tie bidders, then the land will be at once put up for oral bidding and awarded for purchase to the highest qualified bidder.

The balance of the purchase price of the land, after deducting the 25 per cent deposited with the bid, may be paid in full at the time of making the award, or may be paid in equal annual installments. or may be paid in one installment at the expiration of five years from the date of the award. All sums remaining unpaid after the date of the award will bear 6 per cent interest per annum from that date until paid.

A corporation or like association of persons may make but one purchase of the maximum amount of land, 1,024 *hectares*. A corporation or association, any member of which has purchased any land under the law, either as an individual or as a member of any other corporation, will not be permitted to purchase.

Patents are not to be issued until after five years from the date of the award, and during that five years the purchaser must occupy, cultivate, and improve the land, and may not sell the land or in any manner encumber the litle.

THE CHINESE BOYCOTT.

It may safely be said that in spite of the prompt action of President Roosevelt in compelling American emigration officers to place a more liberal construction on the exclusion laws against the Chinese, the boycott of American goods—in fact, everything American—throughout the Far East, by the Chinese, is going on apace. From Tientsin clear around to the Federated Malay States and the Straits Settlements come reports of activity in Chinese circles against American interests. And right here in Manila, where the Chinese are doing business under the protection of the American Government, the boycott is on—silent in its operations, of course, but a boycott all the same. Here in Manila the Cantonese Society, which represents probably all the big local Chinese interests, as well as those throughout the provinces, is the factor Americans have to contend with. Chinese boards of trade and other commercial bodies at first sought to induce the Cantonese Society to declare open boycott against our interests. This the society, after careful consideration, decided it could not do, being as it is under the protection of the American Government; but it did decide, and so informed the commercial bodies in the homeland, to lend to the movement its moral and financial support. We have it from a reliable source that this *moral* support is nothing short of a secret boycott, and that the Chinese have kept their work to lend financial assistance to the movement in China by sending large sums of money over there in the interest of the campaign.

It is impossible at this time to correctly determine what this antitrade movement against the Americans will mean in the way of financial loss to the exporters of the United States. Already Transpacific shipping interests, controlled by American capital, are feeling to a marked degree the effects of the boycott. If all reports are true American bottoms are calling at China ports in vain for native cargo. Merchants in China have ceased to even talk about when they may resume trade relations with the importing houses that handle American goods, and so violent has the agitation become in some trade centers that threatening demonstrations against American consulates, etc., by the ignorant classes, are of almost daily frequence. All this, in the face of instructions to the viceroys from the Peking Government to prohibit, and if necessary, forcibly, prevent the continuance of the boycott and violent anti-American demonstrations awaiting result of negotiations which are now pending between the Washington and Peking officials.

We gather from advices in the daily papers that President Roosevelt has entered upon a settlement of the Chinese grievances with that same strenuosity that characterizes all his diplomacy. By his direction the State Department has "put the matter up" to the consular and immigration officials "straight from the shoulder." These public servants (included in the latter class being those of the Philippine Islands), have been informed that the law and new regulations for carrying it out "must be enforced with the utmost care." The President informs them that "they will be held to a rigid accountability for the manner in which they perform this duty." Diplomatic representatives in China are cautioned not to sign certificates for departing Chinese without first making a rigid examination into the merits of the case, and, according to the San Francisco correspondent of *The South China Morning Post*, emigration officials are ordered to make a radical change of policy and accept such certificates as evidence of the Chinese's right to land in American territory "unless there is good reason to assume fraud." President Roosevelt says:

"Under the laws of the United States and in accordance with the spirit of the treaties negotiated between the United States and China, all Chinese of the coolie class, that is, all Chinese laborers, skilled and unskilled are absolutely prohibited from coming into the United States, but the purpose of the Government of the United States is to show widest and heartiest courtesy towards all merchants, teachers, students and travellers who may come to the United States, as well as towards all Chinese officials or representatives in any capacity of the Chinese Government. All persons of these classes are allowed to come and go of their own free will and accord, and are to be given all the rights, privileges, immunities and exemptions accorded to citizens and subjects of the most favored nations."

The President has, according to the same source of information, issued special instructions through the Secretary of Commerce and Labor, that while laborers must be strictly excluded from American territory, the law must be enforced without harshness, and that all unnecessary inconvenience and annoyance towards those persons entitled to enter American territory must be scrupulously avoided. The officials of the immigration department have been told that no harshness in the administration of the law will for a moment be tolerated and that any discourtesy shown to Chinese persons by any official of the government will be cause for immediate dismissal from the service. The correspondent of *The South China Morning Post* says:

"The foregoing fairly summarized the official action of the government. Of course, this does not settle the matter of Chinese-American relations. Its early effect on the boycott, which is the most palpable thing at the moment, will be noted with interest, but for both countries the future holds much that will not be settled by an executive order. Deeper than this matter, and bound up with it, is the whole question of exclusion."

During the last month we have discussed the question of free admission of the coolie class into American territory with several prominent Chinese of Manila, and the concensus of opinion is that this is not desired or expected here in the Philippines. The leading Chinese of Manila say that to let the coolie into the Philippines without restriction would not only work a hardship on the natives, but on the Chinese as well. They cite the fact that in 1898 a large number of coolies was attracted to the Philippines in search of labor in connection with the military forces of the Americans, with disastrous results, financially, to the local Chinese.

Hundreds of coolies, attracted here by the prospect of employment, found that there was no work for them and went destitute, with the result that the local Chinese were compelled to feed and otherwise care for them while they were waiting for transportation home, and then pay the fares of all of them back to China. This condition they do not want repeated, although they do insist on a more liberal law for the exempted classes.

It seems to us that the American Government can not settle this exclusion trouble any too soon. America's trade interests with China demand prompt action, because the longer it is delayed that much longer will our interests be in recovering from the effects of the general boycott movement.

REVIEW.

"Railway Right-of-Way Surveying," by Albert I. Frye, S. B., M. Am. Soc. C. E.—The Engineering News Publishing Company, New York City. Cloth, 6x9 ins.; pp. 50; price $1 gold, plus postage.

This little book outlines a modern system of right-of-way surveying, leveling and mapping. Though the system as a whole applies particularly to railroads, the "adjustment diagram" feature will be found useful in the special adjustment of streets, canals, highways, and old boundary lines. The method of surveying herein described must not be confused with the common one of using the outside head of rail as a base line for locating the various structural features. Vast sums of money have been spent on such surveys, leaving no permanent field reference to lines run, and recording sets of maps without any measurements whatever. The simplest system, and that giving the most accurate, available, and permanent records, is one that reduces the important field measurements and office data to rectangular co-ordinates referred to an established center line. This is the system here presented. Address THE FAR EASTERN REVIEW.

"The Field Practice of Railway Location," by Willard Beahan, B. C. E.—The Engineering News Publishing Company, New York City. Cloth, 6x9 ins.; 260 pp.; 43 illustrations and 7 folding plates. Price $3 gold, plus postage.

The object of this book is to record the methods commonly used by American engineers in the western part of the United States in the location of railroads built since the Civil War. A most valuable study for a locating engineer. Address THE FAR EASTERN REVIEW.

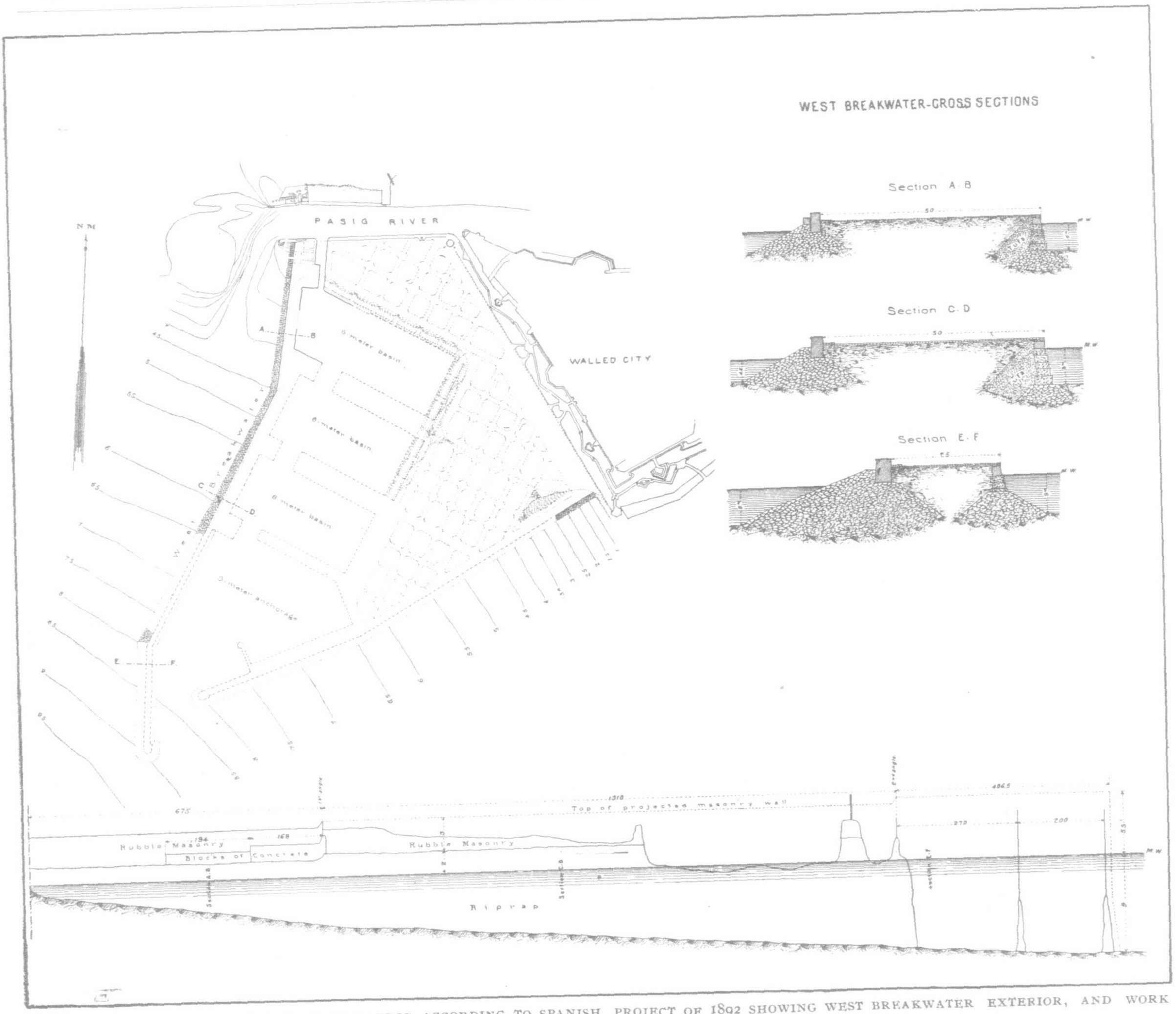
"Reinforced Concrete," by A. W. Buell and C. S. Hill; Part I., "Methods of Calculation;" Part II., "Representative Structures;" Part III., "Methods of Construction."—The Engineering News Publishing Company, New York City. Cloth, 6x9 ins.; 434 X. pp.; 311 illustrations and five folding plates. Price $5 gold, plus postage.

In preparing this book the authors have had in mind a treatise for designing and constructing engineers, following American practice, and governed by the conditions which prevail in America. In gathering materials for this book the authors have drawn freely upon the engineering journals of Europe and America, on the proceedings of technical societies, and on personal experience in designing and constructing works in reinforced concrete. Address THE FAR EASTERN REVIEW.

"Mechanical Appliances and Novelties of Construction," by Gardner D. Hiscox, M. E., being a supplementary volume to the author's work entitled "Mechanical Movements, Powers, and Devices."—The Norman W. Henley Publishing Company, New York City. Price $3 gold, plus postage; cloth; illustrated.

This is an encyclopedia of mechanical movements and mechanical appliances, including many novelties of construction used in the practical operation of the arts, manufactures, and in engineering, and intended for engineers, draughtsmen, inventors, patent attorneys, and all others interested in mechanical operations. Address THE FAR EASTERN REVIEW.

"Mechanical Movements, Powers, and Devices," by Gardner D. Hiscox, M.E., 10th Edition, Vol. I Cloth; 400 pp.; 1,800 illustrations. Price $3 gold, plus postage.—The Norman W. Henley Publishing Company, New York City.



MANILA PORT WORKS.—GENERAL PLAN OF HARBOR ACCORDING TO SPANISH PROJECT OF 1892 SHOWING WEST BREAKWATER EXTERIOR, AND WORK COMPLETED TO JUNE 1896

STEEL PIER CONSTRUCTION, MANILA PORT WORKS

(Continued from page 57.)

be able to tie up at the piers with safety if she comes into port with not more than a 29-ft. draught. In this connection it is interesting to note that the tides are not at all even in Manila Harbor, a disadvantage not experienced in other ports of the Orient; nor does it generally reach the height attained at other places. The mean tide here the year round is about 2½ ft. It is estimated, however, that with a uniformly deep harbor, and the proposed pier facilities, immense benefit will accrue to shipping. The present expensive system of lighterage will be done away with and demurrage reduced to the minimum.

CHANGE IN PORT WORKS SUPERVISION.—The plans for the new piers have been prepared with great thoroughness and careful regard for detail by Mr. H. C. DeLano, C. E., assistant engineer in charge of the deep-water harbor, under the direction of Major C. McD. Townsend, Corps of Engineers, U. S. Army, who, after a long and efficient tour of duty in the Philippine Islands, has just relinquished his office to Major Walter L. Fisk, Corps of Engineers, U. S. Army, who recently arrived in Manila from America. Major Townsend's engineering work in the Philippines has been of the highest order, and it is with much regret on the part of the government that it is compelled to lose his services, particularly at this time, when large works which he has started are just beginning to materialize. Major Townsend is not only a thorough engineer but a delightful and courteous gentleman as well. He is considerate of those about him and painstaking in every detail pertaining to his high profession. Major Townsend has depended largely upon the efficient services of Mr. DeLano in the administration of his office, and at all times since their association there has been a perfect understanding between them of the work under way. This has not only rendered their respective duties pleasant, but has kept them in perfect accord, one with the other, a condition in engineering undertakings of great magnitude which makes for successful accomplishment.

THE STEEL PIERS.—The two steel piers about to be constructed are the undertaking of the insular authorities, for which the Philippine Government recently set aside an appropriation of -P-1,100,000 Philippine currency, or $550,000 gold. One pier will be 650 ft. long by 110 ft. wide, and the other 600 ft. long by 70 ft. wide, and they will be located as shown in accompanying drawings. In addition to these structures, the Quartermaster's Department of the army will also be provided with a pier, 500 ft. long by 60 ft. wide, its location also being shown in the drawings. The contract for this pier has been let to Messrs. J. G. White & Company, Inc., who are about to begin the construction. It will be of wood, with piles protected against the toredo by the perfection process.

STEEL AND CONCRETE SUBSTRUCTURE.—Both piers of the insular government are to be of the same design, the only difference being in dimensions. They will be supported by a series of pile clusters inclosed in a thin steel shell, which will be filled with concrete. The result aimed at is that when the steel shell becomes corroded and falls apart the concrete will have developed sufficient strength to bear all the strain put upon it. The steel casing is estimated probably to last longer than five years and by that time the concrete will have attained all the strength expected of it. In the case of ⅓ of the piles each cylinder will be driven to a grade of 10 ft. above bottom, ⅓ to a grade of 15 ft. above bottom, and the remaining ⅓ to a grade of 20 ft. above bottom.

After the cylinders have been driven in position and the mud pumped out of them the concrete will be spouted to a level with the tops of the highest piles, the water pumped out of the cylinders and a steel reinforcement set in position. Then the remainder of the concrete will be put in. The concrete deposited under water will be of the proportions 1, 2, 4, and that in the reinforced portion of the cylinders will be of the proportions 1, 2½, 5, with the exception of the last 2 ft., which will be capped with concrete of the proportions 1, 1, 2.

BRACES AND DECK SUPPORT.—These cylinders are to be spaced in bents 25 ft. apart, with a 20-ft. interval between cylinders and capped with 37¼-in. plate girders, which are to be fastened to each cylinder with two 1¼ 24-in. bolts let into the concrete of the cylinders. The first bent of cylinders is to be an exception to the above rule, in that it will be spaced 45 ft. out from the bulkhead, and capped with 46¼-in. plate girders bolted to the cylinders as heretofore described. The first bent will be connected to the shore abutment with 46¼-in. plate girders spaced 10 ft. apart, and bolted to the shore abutments in the manner above described, and connected to the first bent cross-caps. At right angles with and connected to the large first bent rangers there will be 10-in. 25-lb I-beams, spaced 5 ft. apart, to support the deck. The 25-ft. spaces will be spanned by 24-in. 80-lb I-beams, spaced 5 ft. apart and connected to the cross-caps. Along the sides of the piers there will be placed box girders connected with the cross-caps and constructed of two 18-in. 55-lb I-beams with ½ 20-in. cover plates. The object of the box girder is to give resistance against impact of small vessels with the piers.

The outer corners of each pier will be constructed of 18-in. 55-lb I-beams bent to a quarter circle of about 15 ft. radius so as to connect with the adjacent box girder and each header, as shown in an accompanying drawing. The quarter circle corners will be supported and braced by 18-in. 55-lb I-beams, extending radially from the middle and the ends to the centrally located 8-pile cylinder, upon which they bear, by 1⅛-in. bolts. There will be a system of intermediate bracing composed of 10-in. 25-lb I-beams with tie rods 1⅛-in. in diameter connected with the quarter circle and radial beams as shown in the drawing. These rounded corners are designed to greatly facilitate the berthing of vessels.

The decking will be constructed of slabs of concrete in the proportions 1, 2½, 5, with steel reinforcement of expanded metal. This is designed to sustain a floor weight of 400 lbs. per sq. ft.

BLOCK PAVEMENT AND ASPHALT OVER DECKING.—Over the concrete decking will be placed a wooden block pavement set in asphalt. Provision will be made in the substructure of the larger pier for a 50-ton crane with which it is proposed to equip it. This crane will enable manufacturers shipping heavy machinery to the Philippines, or from Manila, to have safe and speedy landing or loading at a reasonable cost.

Along the sides and ends of the piers a row of fender piles will be placed, as shown in the drawings, connected and braced together by a walling composed of three 6x12-in. creosoted Oregon pine timbers let into the piles 2 in. and bolted to each by 1⅛-in. bolts. Between the piles will be placed chocks of 10x12-in. creosoted Oregon pine timbers, which will be fastened to the walling by ¾-in. bolts. The fender piles will be fitted with car-spring buffers placed between each pile and the pier structure, to reduce the shock of impact from the vessels.

There will be two large cast-iron mooring posts, of the form and dimensions shown in the drawings, on the large cylinders at the outer corners, and two on the shore abutments of each pier, which will also be furnished with four small cast-iron mooring posts placed and fastened as shown in the drawings. In addition to the above moorings, cast-iron cleats will be placed along the fender walling at 50-ft. intervals.

For the purpose of determining the number of piles to be required in each cylinder a test pile has been driven and loaded to 65 tons without appreciable sinkage. Borings will be taken alongside of this pile and in the areas over which it is proposed to construct the piers, and from data thus obtained the safe loading value of the piles will be determined.

IMPROVEMENT OF PORT AND RIVER

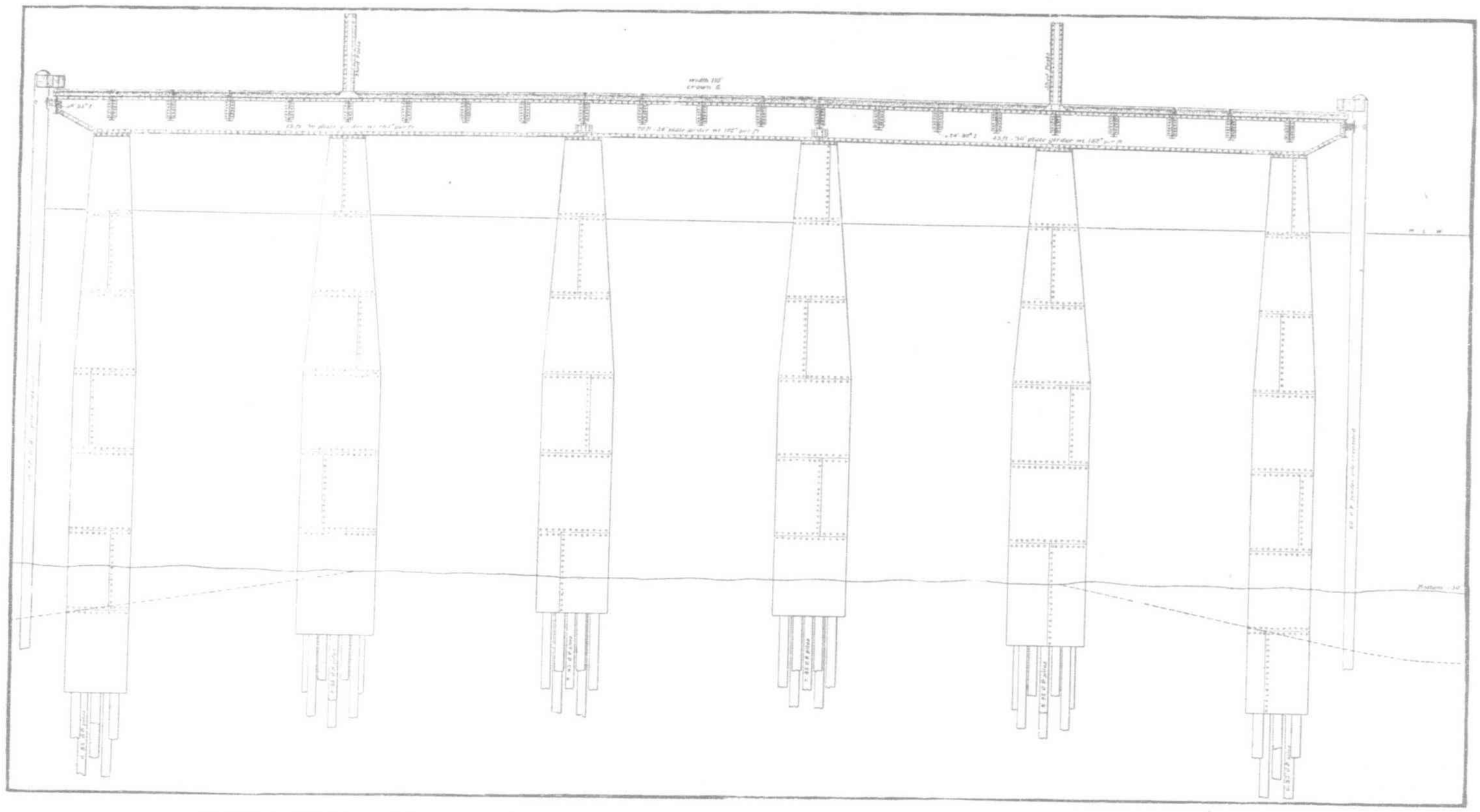
Major Townsend's report on the operations of his office during the fiscal year ended June 30th, 1905, has just been submitted to the Governor-General of the Philippine Islands, through Commissioner W. Cameron Forbes, Secretary of Commerce and Police.

According to this report the total appropriation for the improvement of the Port of Manila and Pasig River, made by the Philippine Commission, since October 15th, 1900, amounts to $4,398,000 United States currency. Before describing the existing project Major Townsend deems it advisable to give a brief summary of the work done previous to American occupation. In this connection he says:

The improvement of the Port of Manila was begun in 1755. At that date the Pasig River emptied into Manila Bay at Fort Santiago, and what was called the Port of Manila consisted of the portion of the river between its mouth and the site of the present Bridge of Spain. A bar obstructed the entrance to the river which limited navigation to light bancas.

In that year were constructed two wooden jetties extending into the bay which caused the bar to recede, but also produced a large accretion to the shore of Manila Bay, especially N. of the river, so that it became necessary to lengthen them from time to time. Stone quays were also built along the river banks, but of weak section and having little depth along their fronts. There is also reported the construction of a basin on the right bank of the river, having a depth of 5 meters below mean tide. In 1833 a dredge was purchased

MANILA PORT WORKS.—PLAN AND ELEVATION OF STEEL PIERS ABOUT TO BE CONSTRUCTED FOR THE PHILIPPINE CIVIL GOVERNMENT



MANILA PORT WORKS.—DESIGN OF PIERS WITH CONCRETE CYLINDER FOUNDATIONS AND CONCRETE DECK

by the government and a narrow channel of 12 ft. depth was maintained across the bar by dredging annually about 100,000 cubic meters of material.

Numerous projects have been instituted for the improvement of the port, but the first suggestion of the present outer harbor appears to have been made by Spanish military engineers who proposed to construct a breakwater in the bay, on which a fort could be located to protect the city in time of war and afford a refuge for the fleet. It is noted that this work will also be beneficial to the shipping interests of the city.

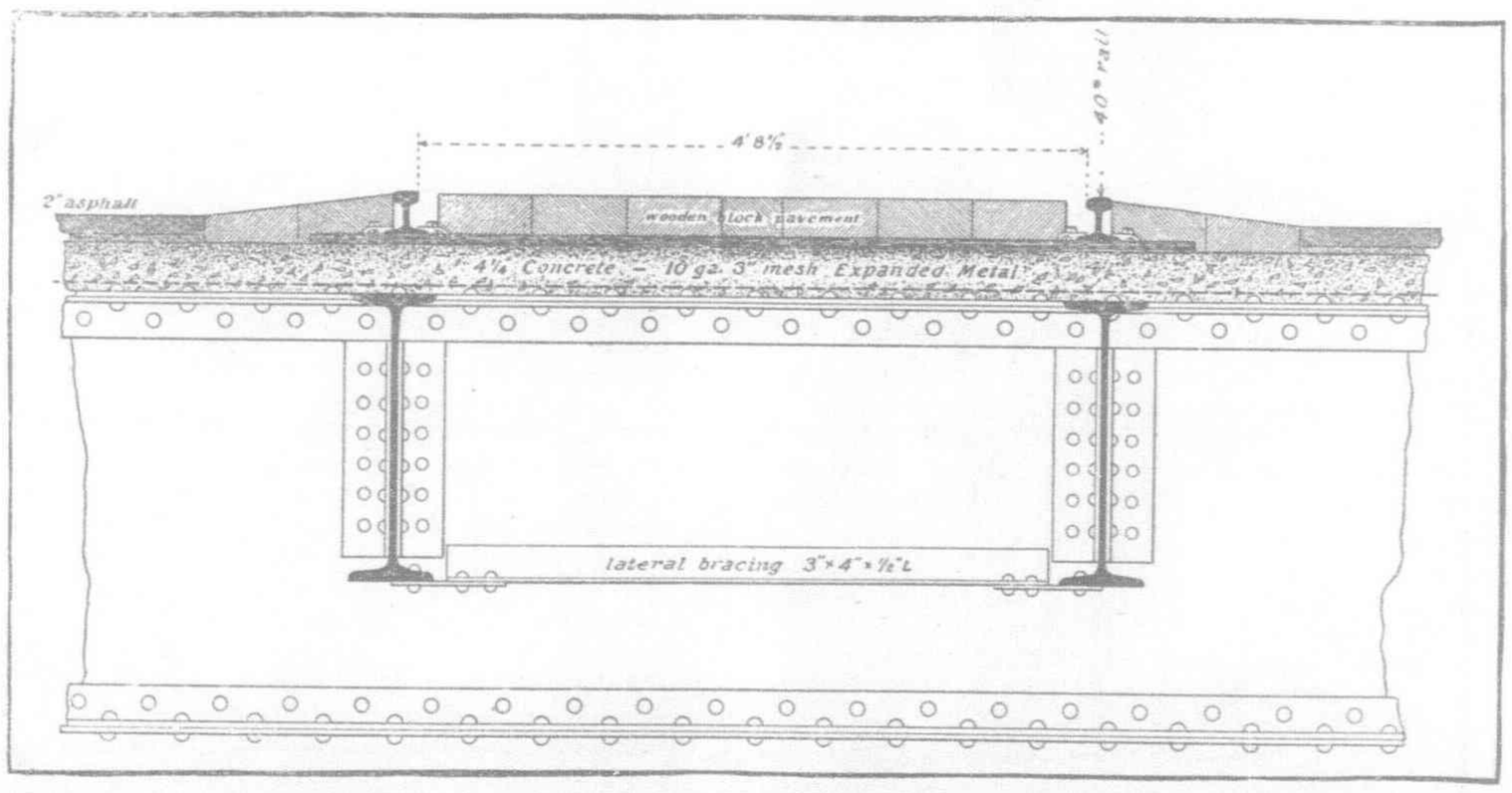
In 1667 there was established in the Philippine Islands a bureau of public works, to which was assigned among its other duties that of studying the improvement of the port of Manila. A preliminary project was submitted in 1876 by Sr D. Eduardo Lopez Navarro, which received the approval of the Spanish Government in 1879, with certain modifications, which were referred back and forth between the home government and the colonial authorities until March 16th, 1892, when the project was finally approved. This project deals with the improvement of the outer harbor, of the Pasig River, and of the esteros of the city. The project for the outer harbor is shown in an accompanying drawing. The works projected had for their object the construction of (1st) an ante port 9 meters deep, (2d) two basins 9 meters deep each containing 180,000 square meters for large sea going vessels, (3d) a basin 6 meters deep with an area of 215,000 square meters for vessels of the coasting trade, (4th) a canal of communication between this last basin and the Pasig River 5 meters deep, and 20 meters wide for the first 100 meters, over which it was proposed to construct a draw bridge, and 5 meters wide in the other 125 meters, (5th) an earth fill surrounding the basins on which warehouses were to be erected. A ship yard for repairing all classes of vessels is also mentioned in the project, but not shown on the plans.

To accomplish those objects it was proposed to build: (a) a west breakeater beginning near the southern mole at the mouth of the Pasig River and extending S. 6° W. for a distance of 676 meters, thence S. 26° W. 1310 meters, thence due S. 486.5 meters; (b). an E. breakwater starting near the present monument to Legaspi, and extending SW. ¼ W 1280 meters and hence WSW 771.5 meters; (c) walls inclosing the various basins and canal; (d) to dredge the basins and canal to the depth proposed, and (e) to fill the space between the break water, basin walls and the Plaza Santa Lucia with the material thus obtained.

The breakwaters were to be constructed with a base of rip rap to mean tide and a rubble masonry superstructure. The rip-rap substructure was to be given an interior slope of 4 vertical to 5 horizontal, estimated as the natural slope the rock would take on being deposited. The exterior slope was to be 1 on 2 for the first alignment of the W. breakwater, from 1 on 2 to 1 on 3 for the second alignment, and from 1 on 3 to 1 on 3½ for the third; in the E. breakwater, 1 on 2 for the first alignment, and from 1 on 2 to 1 on 2½ for the second.

The masonry superstructure also varied in the various portions of the breakwater, having a height of 4.37 meters and top width of 1.5 meters in the first alignment of the W. breakwater, a height of 5 meters and top width of 2.5 meters in the second, and a height of 5.5 meters and width of 3 meters in the third. The interior face of the parapet was to be vertical, the exterior face was to have a slope such as would increase the width of base 5/10 of a meter. This wall was to be surmounted by a coping of cut stone 0.37 of a meter in height on the first alignment and 0.8 of a meter on the second and third. As a further protection against wave action large concrete blocks were laid against the exterior slope of the parapet of the first alignment and heavy rip-rap proposed for the other two alignments extending to a height of 2 meters above mean time. The dike was to end in a mole 33 meters in diameter of concrete and rubble masonry founded on a rip-rap base, 3.5 meters below mean tide at its further extremity, but to be protected from wave action by concrete blocks if in the judgment of the engineer in charge such protection was necessary.

The E. breakwater was to be similarly constructed. The walls of the basins were to have a foundation of rip-rap with a monolithic base of concrete in sacks, on which were to be deposited concrete blocks to mean tide, and



MANILA PORT WORKS.—TRACK AND FLOOR DETAILS OF THE NEW PIERS

above this elevation rubble masonry with a cut stone coping. The top of the rip-rap foundation was to be on a level with the bottom of the various basins. The height of the walls varied from about 1 meter above mean tide in the canal to 3 meters in the ante port. These walls were also to be backed by a pile of rip-rap.

The estimated cost of the outer harbor was five million (5,000,000) pesos.

The project also contemplated maintaining a channel in the Pasig River and across its bar by dredging; the reconstruction of the quay walls along the river banks, and an improvement of the upper Pasig considered as an accessory to the harbor improvement as it afforded the most feasible method of transporting the rock required in the works.

A general improvement of the esteros within the City limits by dredging and construction of quay walls was also proposed.

Upon the approval of the provisional project, there was created by decree of January 2d, 1880, the Junta of the Port of Manila, to generally supervise the work of improving the harbor and to administer the funds set aside for the purpose. Those funds were principally derived from a duty on imports and exports and a tonnage tax on vessels entering the port. These taxes originally were 2% on imports, 1% on exports, 20 centavos a ton on vessels navigating the high seas, and 10 centavos a ton on those engaged in the coasting trade, but were modified subsequently by various decrees, and other funds were set aside for works assigned to the junta, such as the construction of lighthouses, and the building of the Ayuntamiento.

The funds collected from 1880 to 1898 for these purposes were 11,155,873.70 pesos, of which 6,651,444.76 pesos were available for the works of the port. The expenditures of the junta for the same period were 8,740,643.73 pesos, of which 6,707,219.76 were expended on the works of the port. Of this amount 3,566,406.63 pesos were expended on the outer harbor, 1,828,600.64 pesos on the Pasig River, and 653,736.15 pesos on the esteros. The balance 638,477.33 pesos represents concrete blocks constructed but not placed on the work, property at the various quarries, and the machinery and buildings belonging to the Works of the Port at the close of operations. This material greatly deteriorated during the suspension of operations.

The discrepancy between receipts and expenditures appears to arise from the use of certain of the funds for military purposes during the insurrection of 1896.

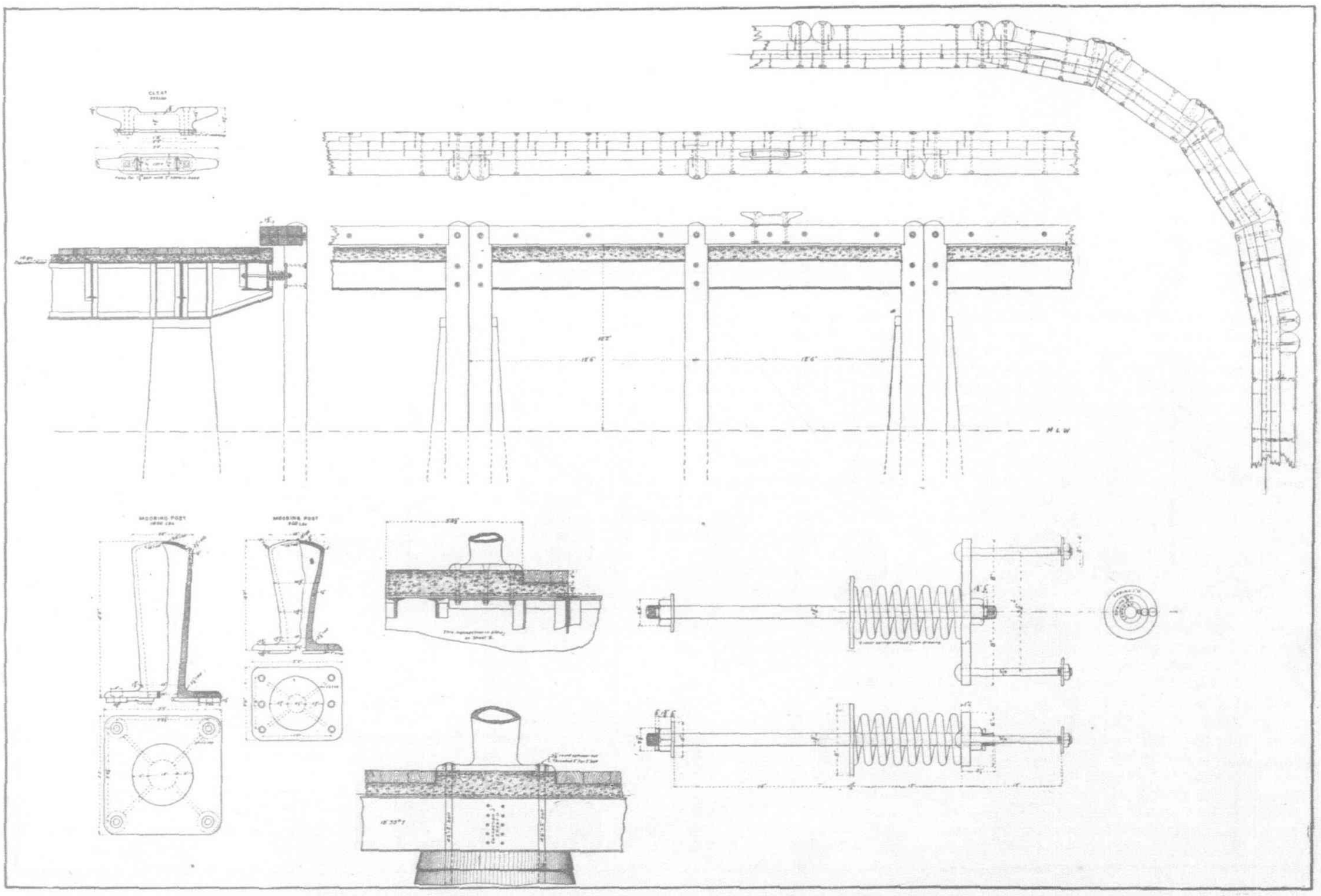
At the close of the Spanish régime, the first alignment of the W. breakwater had been constructed. Of the remainder of the breakwater 600 ft. had been completed except the coping, 2000 ft. to within about 2 ft. of the top of the rubble masonry wall; for 1700 ft. the rip-rap foundation was in place, and portions of the rubble masonry wall built; for 1500 ft. the rip-rap foundation had been begun. 600 ft. of the E. breakwater bad been completed. The walls of the canal had been built; also 2420 ft. of the walls of the 6 meter basin, with the exception of 200 ft. on the W. side which were only partially completed. About 542,000 cub. yds. of rock had been placed of the 1,275,000 cub. yds. estimated to complete the project.

Practically none of the dredging had been done, and of the fill, only a small area on Engineer Island and along the Pasig River with material dredged from the river.

THE AMERICAN PROJECT.—With American occupation the project was again revised. It was evident that the cost of the work would largely exceed the estimates, and that under the Spanish project a long period of time must elapse before the work could be utilized for any purposes, as the breakwaters must first be built to protect the basin walls from wave action during storms and a large part of the latter afterwards constructed before dredging could be begun.

The first great necessity of the harbor was protection to shipping from typhoons and the SW. monsoon which rendered the loading and unloading of vessels in the open bay difficult during many months of the year. To afford this relief as early as practicable, it was decided to complete the W. breakwater, and dredge the area partially protected by it. The cheapest way of disposing of the material was to erect a temporary bulkhead parallel to the shore line behind which it could be pumped. This space in the Spanish project was to form portions of the various basins.

The system of enclosed basins while desirable in European ports where there is a large tidal range, is not as suitable for Manila Bay where the tides are moderate. By constructing locks at the outlets to the basins and basing their depth on high tide, there is in the former ports a large saving in excavation, and the height required for the quay walls is reduced. The basins afford quiet water for loading and unloading vessels but are difficult for large steamships to enter. They also do not admit of a ready expansion of dock frontage to keep pace with the growth of commerce.



MANILA PORT WORKS.—FENDER PILE AND MOORING DETAILS OF THE PIERS.

In American ports for the basins are very generally substituted wharves extending at right angles to the shore, protected where necessary by an exterior breakwater. These wharves constructed usually of wood or iron are much cheaper than the stone quay walls of the basins. For the same frontage they afford a much greater space at which vessels can be moored. This system gives a greater protected area than the enclosed breakwaters of the Spanish project, but not as quiet a harbor. The wharves can readily be multiplied and extended as the demands of commerce increase.

For these reasons it was decided to further modify the project. (The existing project is shown in plan on an accompanying map). Under this project, the W. breakwater is extended 492 ft. to the 30 ft. contour. A detached breakwater extends for a distance of 3,000 ft. approximately parallel to the shore line, with

an entrance 710 ft. wide at mean low water. The walls constructed under the Spanish project have been utilized to form a small inner basin, 19 ft. deep at mean low water, from which a bulkhead extends approximately parallel to the shore line and about 1900 ft. from it to the line of the Spanish E. breakwater. Beyond this bulkhead an area of 330 acres is to be dredged to 30-ft. depth at mean low water, and the dredged material deposited behind it.

The general form of the W. breakwater as adopted in the Spanish project is retained, but the height reduced to 11 ft. above mean low water.

The detached breakwater is given an exterior slope of 4 on 5 (assumed as the natural slope of rip-rap) to a height of 12 ft. below mean low water, and 1 on 2 above this elevation. The interior slope is the natural slope of the rip-rap to low water, thence a slope of 1 on 10. The elevation of the top of the breakwater is 8 ft. above mean low water and the top width 10 ft. Below low water the stone was to be deposited as rip-rap. Above low water, it was to be laid to the slopes designated.

The specifications require that all stone deposited in the substructure shall exceed 100 lbs. in weight; two-thirds the mass must consist of stone weighing at least 1000 lbs. and not least than ⅓ by weight of each load deposited must consist of stone weighing at least 4000 lbs. (which were to be placed on the sea slope). In the superstructure no stone used shall weigh less than 1000 lbs. except those employed for clinking the larger stone, and at least ½ the total weight of each load deposited must be of stone weighing not less than 4000 lbs. The top of the wall was to be composed of stone weighing no less than 2000 lbs.

The stone supplied by the contractors largely exceeded these requirements, over 80 per cent of the weight of the mass delivered consisted of stone exceeding 2 tons in weight. Seventy-five ft. of the breakwaters was constructed of the form shown in accompanying drawing. This form affords a better bond for the superstructure than the one specified. The contractors, however, found difficulty in quarrying rock of the regular sections required.

The bulkhead as originally designed was intended as a temporary structure, to be ultimately replaced by a masonry wall. It consisted of a double row of sheet piling supported by a row of 12-in squared piles, 4 ft. between centers, to which it was connected by 6x12-in walling and tied back to a second row of piling 8 ft. between centers. It was to be reenforced by selected dredged material deposited behind it, but as the work progressed it was found that the structure had not sufficient strength to resist wave action nor the pressure of the mud dredged. It was then reenforced by a rip-rap wall, laid to a slope of 1 on 2 in the shallow water in which it was constructed. This provided protection against typhoons until the detached breakwater could be constructed and gave a sufficient supply of stone to rip-rap the front of the bulkhead to the slope the stone will assume, when the dredging is completed.

This bulkhead is a cheaper structure than the retaining walls of the Spanish project. These walls were designed to support a thrust of sand, and were of too weak a section to resist a mud fill. It has become necessary to reenforce the walls constructed in the inner basin with rip-rap to prevent their being overturned. As the canal is too narrow to permit of such a construction, the mud thrust was taken off the wall by building a water-tight bulkhead behind it, and filling the space between the bulkhead and the wall with river sand.

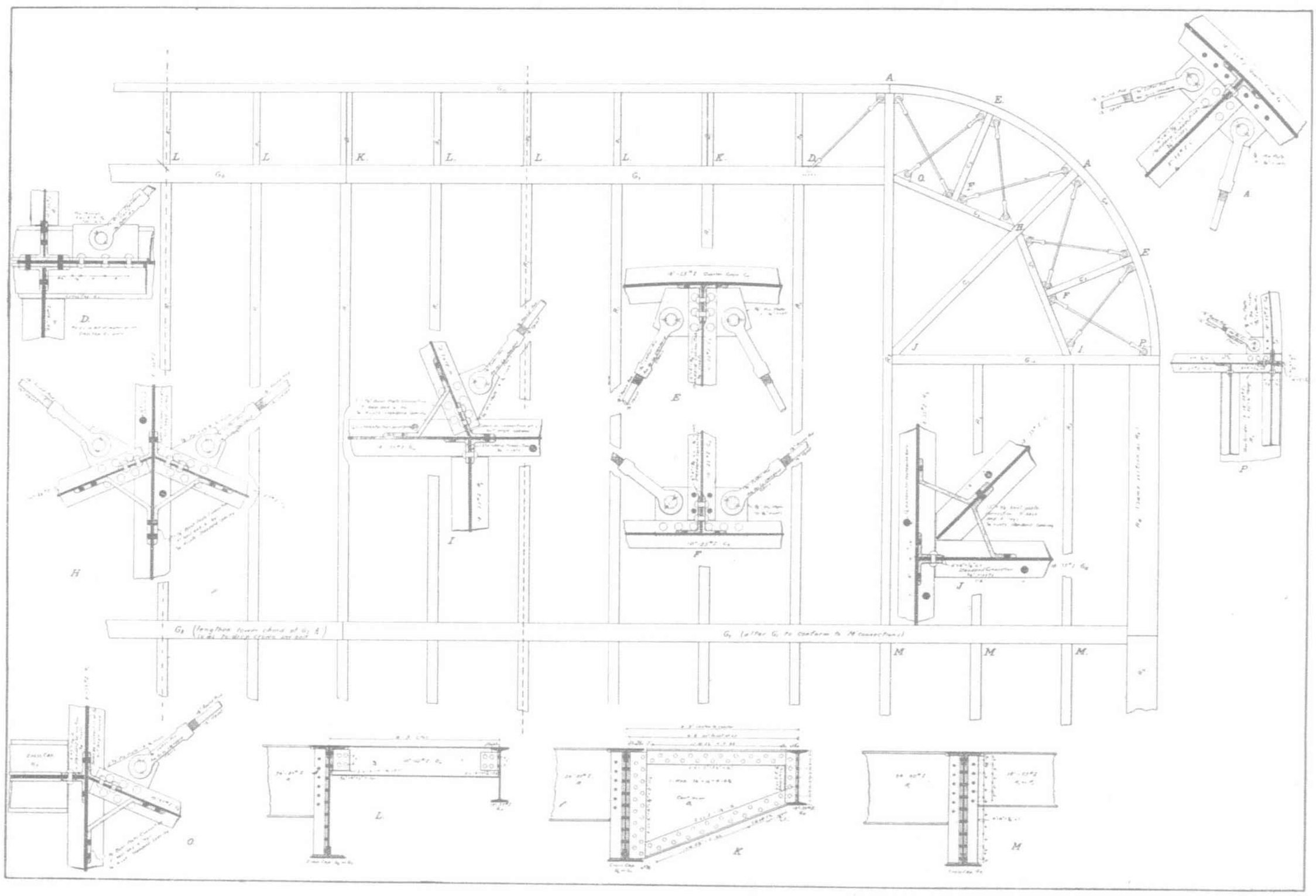
The height of the fill was originally placed at 7.5 ft. above mean low water, but to allow for settlement and also to afford space for additional dredged material, the height was increased to 10.5 ft. The area of land between the Malecon Drive and the bulkhead is 191.4 acres of which about 148 acres were filled to the height indicated. The remainder of the area was occupied by the Quartermaster's Department, U. S. Army, and it was necessary to construct a water-tight coffer-dam to keep the dredged material from overflowing their territory.

The work has been done by the Atlantic, Gulf and Pacific Company under contracts and supplemental agreements dated August 12th, 1901, September 30th, 1901, January 19th, 1903, July 3rd, 1903, and January 31st, 1905.

At the close of the last fiscal year the contractors had completed the bulkhead and protected it with 208,211 tons of rip-rap. The E. breakwater had been extended to the bulkhead line; 3,384,102 cu. yds. of material had been dredged from the harbor and deposited behind the bulkhead; 233,712 long tons of rock had been placed in the W. breakwater, and 106,700 tons in the detached breakwater; 5,373.68 cub. yds. of rubble masonry of the superstructure of the W. breakwater had also been constructed. The stone walls of the inner basin had been reenforced with rip-rap, and a coffer-dam 2433 ft. in length constructed to protect the Quartermaster's Department's buildings from overflow by the dredged material.

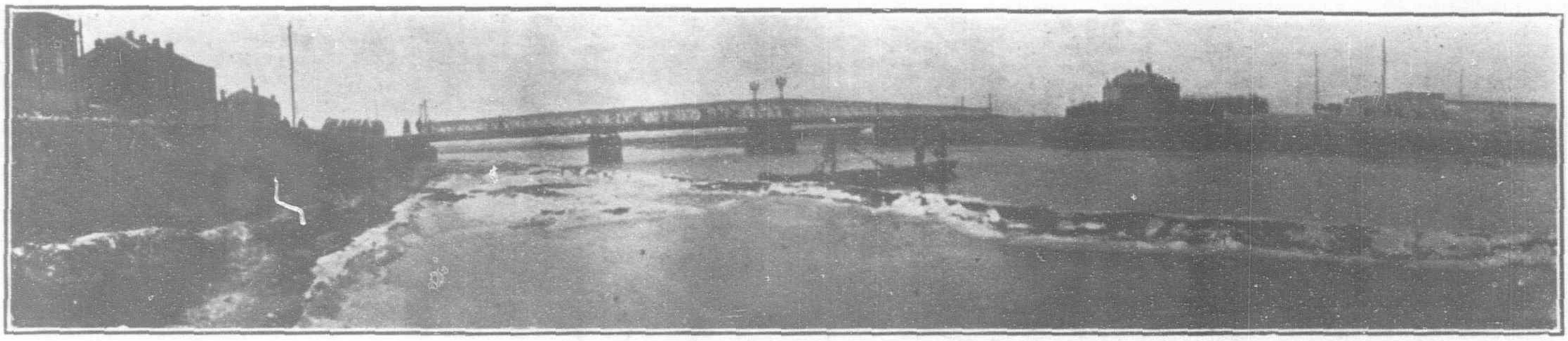
During the present fiscal year 24,571 long tons of rock have been deposited in the substructure of the W. breakwater; 4,838.46 cub. yds. of rubble masonry and 4,058.17 cub. yds. of concrete coping laid in its superstructure, completing the W. breakwater with the exception of the concrete foundation for a light-house proposed for its outer end. In the detached breakwater 342,575 tons of rock

(Continued on page 72.)



MANILA PORT WORKS.—END DETAILS OF NEW PIERS.

TRADE REPORT AND RETURNS OF TIENTSIN, 1904



GREAT INTERNATIONAL BRIDGE AT TIENTSIN, NORTH CHINA

The Tientsin (North China) Trade Report and Returns, compiled and issued recently by order of the Inspector-General of Customs, contains much valuable information of a general character concerning the industrial and commercial development of North China, as well as a fund of absorbing facts about Tientsin and contiguous territory. By way of introduction the report says that on reviewing the trade of Tientsin during the period covered, the general conclusion must, on the whole, be a favorable one. Whatever the future may have in store for this port—the future with its totally revolutionized inland communications, keen competition, and severe tests upon natural shipping facilities—the present Tientsin trade is still a vigorous and a growing one.

MATERIAL PROGRESS OF THE PORT.—Under the liberal and confidence-inspiring policy of Viceroy Yuan, seconded by a body of exceptionally able officials, Tientsin has been allowed full scope for advance and development. In the Native City, during 1904, several large improvements were started. A tramway will ere long traverse the length of the Chinese Bund. The mains of the Native City waterworks are being extended throughout the city and its suburbs. A new iron bridge is being constructed over the Grand Canal near the Haikwan Tao's yamen. The Native City railway station, about 1½ miles to the Northeast of the Viceroy's yamen, has not yet succeeded in drawing as much traffic as was expected, but progress in that direction is also noticeable, and the ground along the splendid road leading to this station is gradually being built upon.

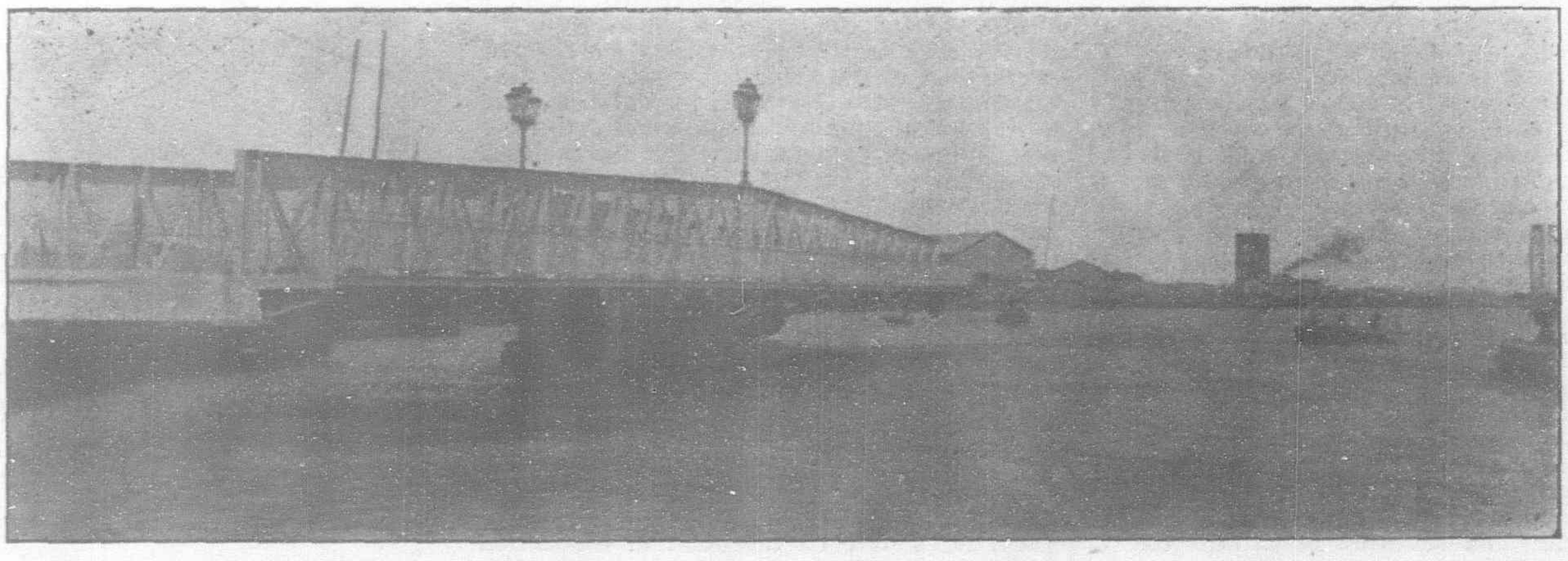
As regards the Settlements, and greatest activity has probably been shown by the Japanese. The German Concession is progressing steadily, and promises to become an attractive residential portion of the port. The British "Extra Concession" has thrown out a few more fringes of houses, while the heart of the old British Town has been enriched during the year by some magnificent mansions for housing the staff of one of its great hongs, a large up-to-date office building, etc. The establishment of the Netherlands Consulate has also brought the number of "full" consulates up to that at Shanghai.

An enterprise of some magnitude was the starting during the year of a lighter service under the management of Messrs. Butterfield & Swire, consisting of seventeen lighters and four powerful tugs, built in Europe and sent out in sections, which were fitted together in Shanghai and then sent oversea to Tientsin. In connection with this enterprise, docks and repair shops were erected at Tangku, which also undertake outside work. Another addition atTangku has been the building of three oil tanks, of 500,000, 500,000 and 1,000,000 gallons capacity, respectively, by Messrs. Arnhold, Karberg & Co.

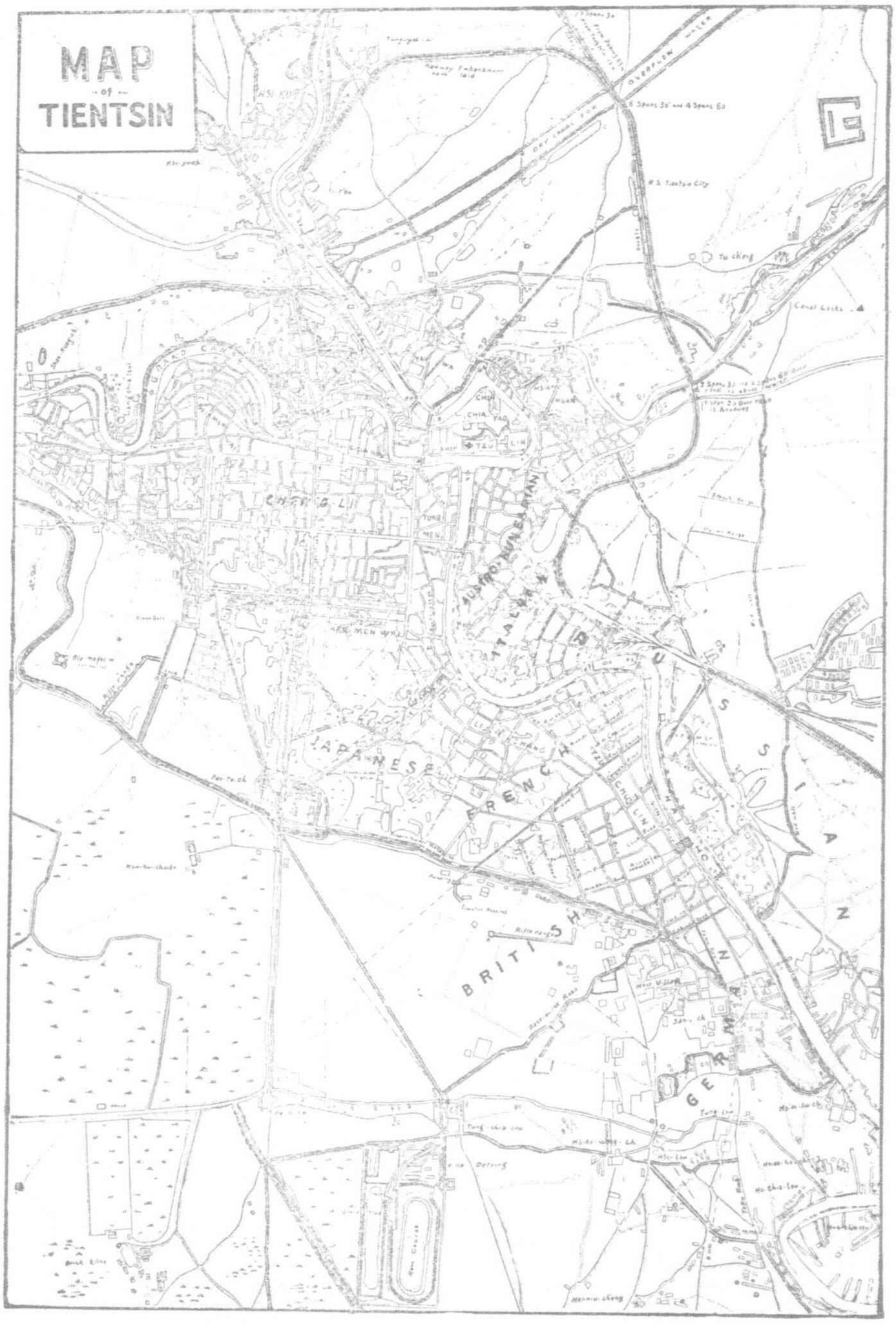
RAILWAYS.—The Peking-Tientsin-Newchwang Railway (Imperial Railways of North China), has taken another great stride forward in traffic and earnings during the past year. The most noticeable advance has been over the portion outside the wall, through the opening of the branch Koupangtzu-Hsinmint'un and the great rush of traffic drawn in that direction by the war operations around Mukden. With an annual expenditure of some $2,500,000, the entire line took in almost $6,000,000, thus showing net earnings during the year to the amount of $3,500,000. The main source of income inside the wall was on goods traffic, which yielded somewhat more than passengers (say, $1,500,000 each), after which comes coal, with almost $600,000. Outside the wall the gross receipts amounted to $1,800,000, as against $900,000 during 1903. The passenger traffic showed substantial improvement, as well as the freight service under almost every head. Substantial additions to the rolling stock for freight are contemplated. The rates remain mostly the same, viz., ½ cent per picul per mile for first-class merchandise to ¼ cent for third-class (coal, bricks, etc.). Calculated according to car capacity per ton, these rates are from 5 to 1¾ cents per mile. The passenger rates are 6, 3½ and 2 cents per mile for the three classes.

The great Pei-Han trunk line is on the eve of completion. There only remains the Yellow River bridge to be finished, it is hoped, in August, 1905, and the constructional service on the stretches adjoining the Yellow River to be converted into regular traffic. The total distance, Peking-Hankow, is 754 miles, of which 342 lie South and 412 North of the Yellow River. The entire distance is laid for single track, excepting some of the more permanent bridges. The Yellow River bridge is on single width, but its mode of construction allows of a widening when necessary without repeating initial operations. It is proposed at first to divide the journey into three day stages: Peking-Shuntêfu-Chêngchou-Hankow. Afterwards it is expected to do the journey in 36 hours, with sleeping cars. The northern portion of the line is laid over flat country, but to the South of the Yellow River it skirts some low hills, with their peculiar troglodyte population, and crosses over picturesque ranges, which form the watershed between the Yangtze Basin and Huai River system near Hsin-yangchou. The passenger tariff per mile is to be based upon 5.8, 3.9, and 1.9 cents for the three classes respectively. The Yellow River bridge has a length between land piers of 3,278 yards. It is composed of 120 spans, of which 50 show 34.12 yards daylight between piers and the remainder 22.90 yards. Each pier is composed of four to six screw piles (1 foot diameter, embedded about 50 feet in the sandy soil), which are braced together and protected by four more piles at the corners. The rails are carried some 16½ feet above high-water level, between the main girders over the longer, and on top of the girders over the shorter, spans. At the end of 1904 about half the number of piers were built Some trouble was experienced with ice, which damaged much of the structural work during the past winter.

The Chêngting-Taiyuan narrow gauge line is being actively proceeded with, and will soon become a *fait accompli*, much to the credit of the French energy, financing, and engineering enterprise which called it into being. The Tientsin-Chinkiang project, however, is still in the state of chronic deadlock which overtook it a few years ago. The Pekin Syndicate railway, a short slanting line apparently running from nowhere, bisecting and bisected by the Pei-Han line, has in reality started on the work



INTERNATIONAL BRIDGE WITH DRAW OPEN



for which it was mainly built, *viz.*, bringing coal from the anthracite fields near Ching-hua, on the border of Shansi, to Tao-kou, the head of navigation of the Wei River, a regular trade route to Tientsin.

River Improvement.—The work of the Hai-ho Conservancy Commission during the year has been directed to three purposes: (1) completing and opening to navigation the third cutting; (2) effecting various improvements, dredging, increasing of radius, etc., for the maintenance of the river along its entire course; and (3) conducting preliminary experiments and considering the ways and means for the great bar improvement scheme.

In addition to being icebound for three months out of twelve, the port of Tientsin has for years past labored under the disadvantage of not being able to maintain in a navigable condition its channel of communication with the sea—made up of the waters of the Pei-ho, the Hsi-ho, the Tach'ing-ho, and the Grand Canal, whose point of confluence is a little above the native city, and whose united volume is thereafter known as the Hai-ho. The question of dealing, on scientific lines, with the improvement of this waterway, is a very old one, because, apart from the interests of trade, the enormous amount of damage caused by the annual overflow of its constituent streams had to be reckoned with. Previous attempts on the part of the territorial authorities to relieve the people from the ever-recurring danger of disastrous floods, by draining off into the Pei-t'ang River through specially constructed canals part of the masses of water which accumulated round Tientsin, while for a time having had the desired effect, are said to have been ultimately responsible for the gradual silting up of the very tortuous course by which the Hai-ho found its way into the Gulf of Pechili. In 1896 even tugboats and lighters could not come up to the British Bund. It was then felt by all concerned that futile discussion must be abandoned in favor of practical remedial measures, and funds were raised for the construction of locks in the canals. The cost of these was estimated at 250,000 taels, of which the Governor-General gave 100,000 taels, the other 3|5 being defrayed out of the proceeds of a British municipal loan at 6 per cent., secured by a levy of 1 per cent. on the customs duties paid by allmerchandise, or ½ per mille *ad valorem*. These locks were on the point of completion when the troubles broke out, but a great deal of damage was done to them subsequently, and the indemnity claimed in respect thereof was 126,000 taels.

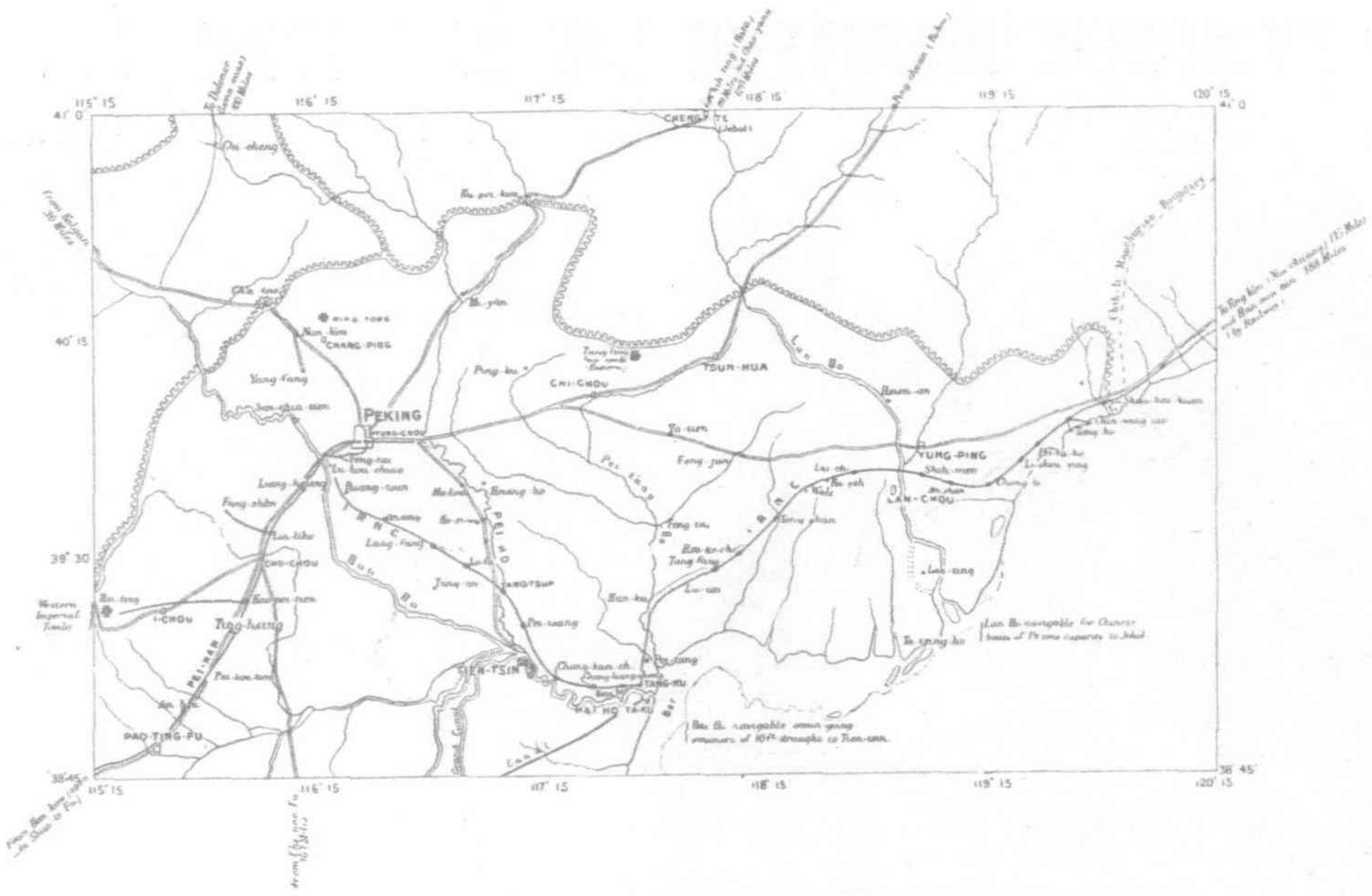
The provisional government, on taking over the city, lost no time in devoting its attention to the matter of conservancy; in fact, until the Hai-ho Conservancy Board was constituted in 1901, they assumed control of the works, meeting all necessary expenses. This Board, which consists of three members, a representative of the Chinese Government, the Senior Consul, and the Commissioner of Customs, to whom are added, with consultative voice only, representatives of commerce, shipping, and the concessions and settlements, obtained authority to raise in 1902 a second loan of 250,000 taels, guaranteed by an additional levy of ½ per mille on all imports and exports, for the purpose of shortening the river by cutting across the five most difficult bends. Towards the maintenance of conservancy works the Chinese Government has, in terms of Article XI of the Peace Protocol in 1901, to contribute a sum of 60,000 Haikuan taels per annum.

After the damage to the old works had been repaired, the systematic straightening of the channel was commenced in October, 1901, under the superintendence of Mr. A. de Linde, a Danish engineer, who has been connected with the river improvement schemes since their inception. By December, 1902, the board was able to report the completion of two cuttings, one ¾ of a mile and the other 1|10 of a mile long, which have shortened the distance from the bar by 4⅘ miles, and have enabled steamers drawing 10 feet 6 inches to reach the Bund in seven to eight hours. The third cutting, about 2 1|10 miles in length, does away with several bad curves and shortens the distance by 5 miles. When the two other projected cuttings shall have been completed, the total distance from Tientsin to the sea—originally 51 miles—will have been reduced to 37 miles, and four more rectangular bends will have been circumvented.

Bar Work.—There is, however, little object in having a river navigable for vessels drawing 13 feet, if they can not get over the bar at its mouth on a lower draught than 8 to 10 feet, and the raising of funds to deepen the bar is the next problem which confronts the mercantile and shipping communities. While the river was in process of silting up, the bar extended farther out to sea, and the pecuniary loss incurred by those concerned, through the detention of steamers and the cost of partial lighterage, imposes in the aggregate a very heavy tax on the trade of the port. Northerly and westerly winds in the Autumn invariably cause low water, and, although those interested may regard with equanimity the spectacle of six steamers lying there for days at a time, the outsider is at a loss to conceive how such a state of things can not but affect trade adversely.

A survey of the bar was carried out in July and August, 1902, by H.M.S. *Rambler*, and an estimate of the cost of deepening the bar channel to 14 feet calls for an expenditure of 450,000 taels on the purchase of two dredgers, and of 70,000 taels per annum for the cost of dredging and works generally. The bar must be dredged to at least 7 feet below its present level to allow steamers with a 14 feet draught crossing it with a tide of 8 feet. To raise funds for this purpose the sum of 145,000 taels per annum is required, and it is proposed to obtain sanction to levy 15 candareens per ton (net register) on all steamers crossing the bar, and to impose on goods a separate ½ per mille charge to be devoted exclusively to bar works as distinct from river conservancy. It is understood that the steamer companies trading to Tientsin, with the exception of one company, which is not satisfied that a careful and complete investigation of the question has been made, are willing to agree to a charge of 1 mace per ton, but decline to accede to a levy of the higher amount. The majority of the steamship companies have built steamers specially designed for carrying cargoes on a low draught, and are said to be averse to let all comers in on an equal footing.

Chinwangtao.—The year 1904 will probably be recorded in the annals of Chinwangtao as

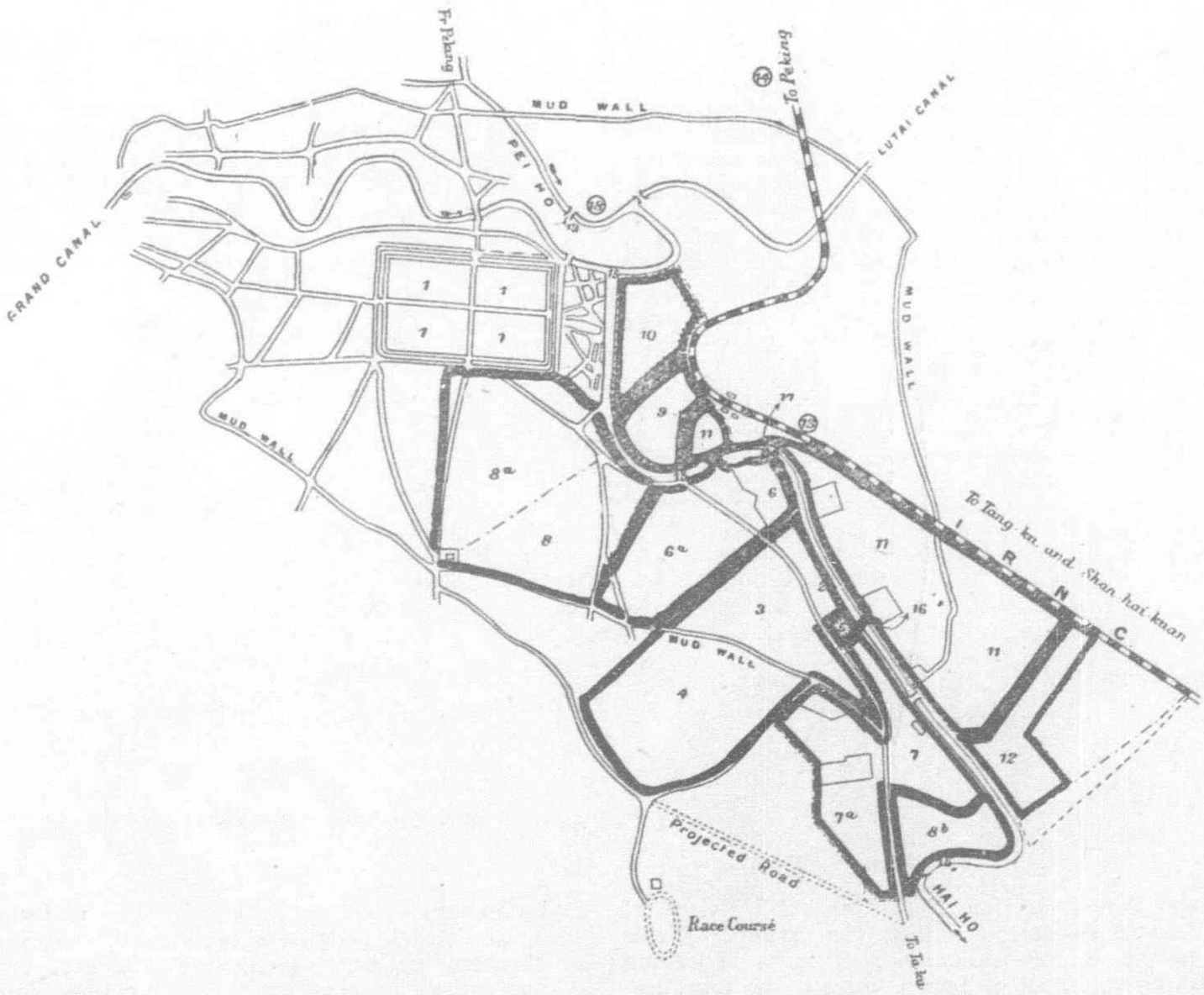


TIENTSIN, THE TRADE CENTER OF NORTH CHINA

the year in which the infant port made its first few tottering steps without the parent's support. Whether these steps will lead straight to an independent existence worthy of mention besides the subordinate *role* as a winter jetty of Tientsin, which must remain its principal function for many a year to come, can not be foretold even at the time of writing this, but there are many hopeful signs that the next winter season will witness a further development of the remarkable progress made in the season 1904-05. The first impulse was derived from the establishment during the second half of 1904 of a permanent coolie embarking station by the Transvaal Chamber of Mines Labor Agency. This brought at once a great amount of life and activity to the port, and directed the attention to additional possibilities and openings for shipping and trade. In connection with these impending developments the Maritime Customs enlarged the scope and functions of their local office, now in charge of a deputy commissioner, added a Haikwan Bank for convenience of local duty payers, and transferred the entire establishment, including the imperial post office, to a new building erected for that purpose. Meanwhile, it was necessary to regulate and secure the most favorable inland duty treatment for a future trade, which then showed incipient tendencies, between Chinwangtao and its North-eastern "hinterland"—Fengtien, Kirin, etc.,—especially during the winter months. This has now (March, 1905) been accomplished, and in general principles adopted, which will secure trade between the regions named and southern ports against arbitrary inland taxes. But, needless to say, the fiscal smoothing of the way is not everything. The remaining power to foster and develop this trade lies in the hands of the Imperial Railways of North China and of the Chinese Engineering and Mining Company, whose sole control of everything that concerns the shipping facilities of the port, and its connections with the main railway line up to the present moment still amount to an almost absolute power over the trade and its chance of development so long as the present status and conditions remain as they are. After guarding a virtual monopoly of the use of its piers and jetties for some years, this company decided, in the course of 1904, to extend facilities to the steamers of other companies; albeit, on its own terms and with retention of minor monopolies, such as the provision of stevedores and coolies of all kinds. The result was a great development during the last weeks of 1904 and subsequent months, as many as 10 steamers at a time being within the port limits on certain days. The main portion of this tonnage was employed for Tientsin cargo, carried practically in bulk to and from Chinwangtao by railway. But the feature of the 1904-05 season has been the springing up in appreciable proportions of a Chinwangtao local trade, *i.e.*, goods landed at the port were "cleared Customs" on the spot and sent straight to the populous and thriving markets in the neighborhood—Lanchou, Yung-p'ing, Shanhaikwan, etc. Up to now this trade has been in the hands of a single Chinese firm with extensive southern connections. As to the extra-mural trade by rail through Shanhaikwan, so far most of it has consisted of supplies, liquors, etc., forwarded to the war area by adventurous traders throughout the winter. One or two healthier trade feelers have, however, come forward in the shape of considerable shipments of beans from Fengtien to southern ports via Chinwangtao. It is reported that these shipments will take place regularly every winter from the closing to the opening of the port of Newchwang. When the facilities for a continuation of winter trade in these regions become better known and appreciated, we may look forward to great developments of the erstwhile Tientsin jetty, both as a shipping port of extra-mural provinces during the winter and a mediator of a flourishing local trade throughout the year.

SHIPPING.—The advance in shipping and tonnage during recent years has been slow, if at all noticeable. Not only have the figures of the extraordinary year, 1902, never been approached, but those for 1899 still maintain their second position. Tonnage at Chinwangtao has now expanded into almost one-quarter of that which lifts itself wearily over the Taku Bar.

IMPORTS.—As a rule there is little information to be conveyed in a small compass on the subject of imports. The relative importance of the various foreign staples and the main factors determining their periodical fluctuations apply practically to all ports alike, and are usually better known outside of China than within.



SKETCH OF TIENTSIN.—EXPLANATION:—1. Chinese city (walls pulled down to form roads). 2. British original concession. 3. British extension (settlement). 4. British extension (extra mural). 5. American concession. 6. French concession. 6A. French extension. 7. German settlement. 7A. German extension. 8. Japanese settlement. 8A. Japanese extension. 8B. Japanese additional extension (8A and 8B administered by the Chinese Government). 9. Italian settlement. 10. Austro-Hungarian settlement. 11. Russian settlement. 12. Belgian settlement (not occupied). 13. Railway station (Tientsin settlement). 14. Railway station (Tientsin city). 15. Hai ho. 16. Proposed Russian bridge. 17. International bridge. 18. Yamen of the Governor-General. 19. Iron bridge. 20. East Arsenal (French barracks).

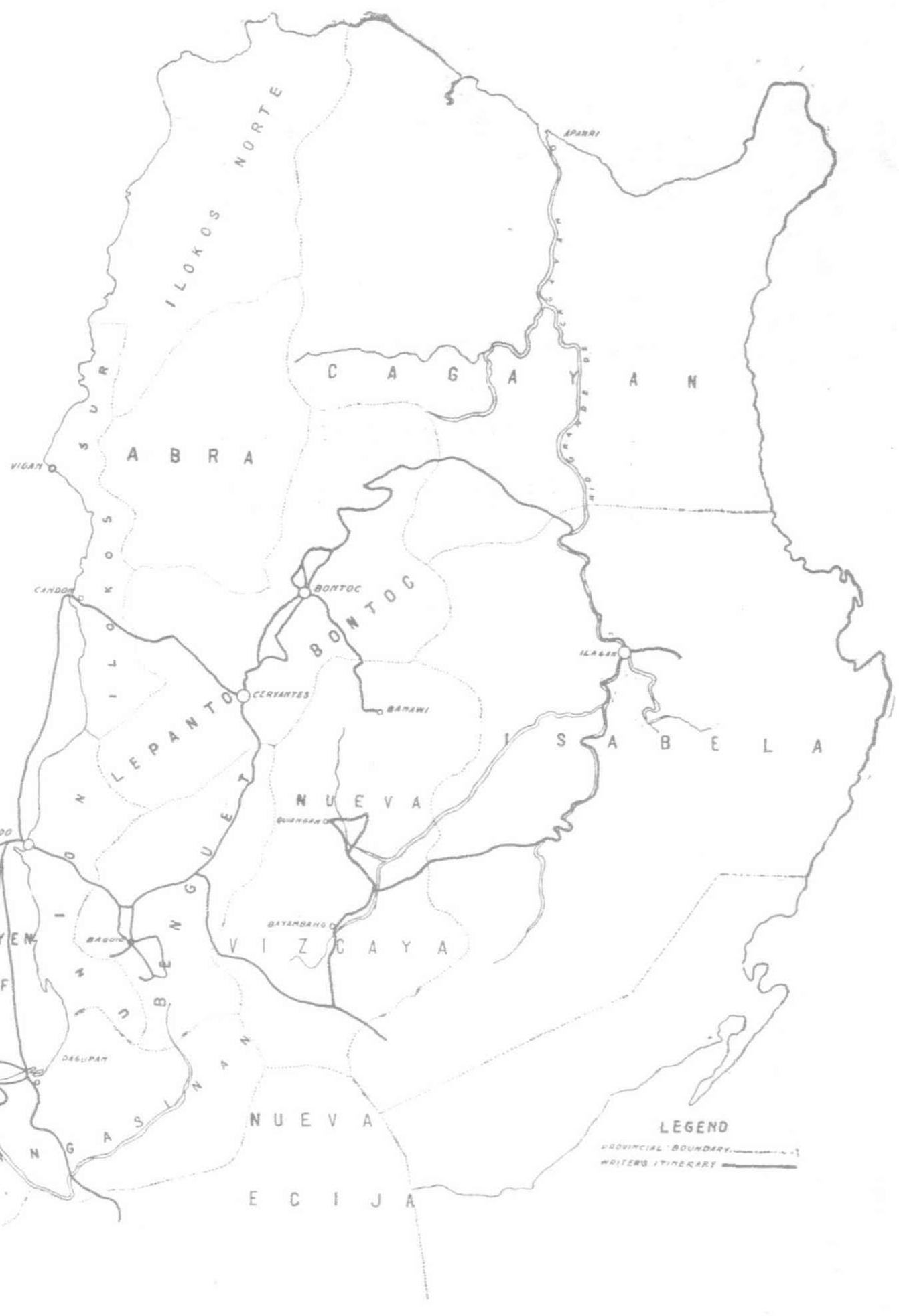
IRRIGATION AS PRACTICED BY BONTOC IGOROTS OF NORTHERN LUZON, P. I.

Dr. Albert Ernest Jenks, who severed his connection with the Philippine Government at the beginning of the current month, as chief of the Ethnological Survey, on account of ill-health, and sailed for his home in Elroy, Wisconsin, issued on the eve of his resignation a most instructive volume devoted to an exhaustive study of the Igorot Tribe which inhabits the Bontoc section of the present Province of Lepanto-Bontoc. While the study of this people is, on the whole, of most absorbing interest, in all of Igorot culture the most apparent and strikingly noteworthy fact is his agriculture under an extensive and original system of irirgation.* In this industry the Igorot has reached his highest development. On agriculture hangs his claim to the rank of barbarian—without it he would be a savage.

Dr. Jenks says that Igorot agriculture is unique in the Island of Luzon, and, so far as known, throughout the whole Philippine Archipelago, in its mountain terraces and irrigation.

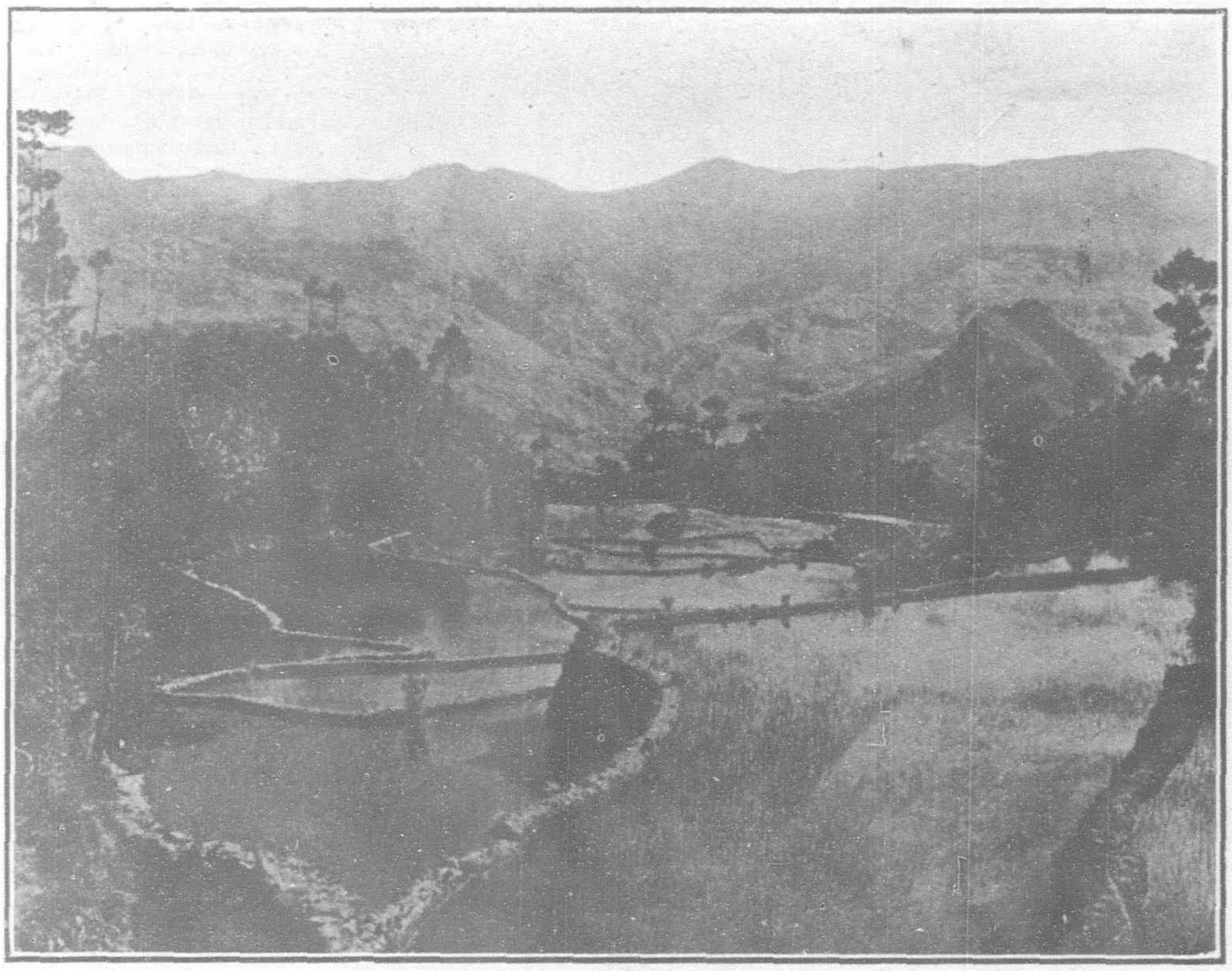
There are three possible explanations of the origin of Philippine rice terraces, according to Dr. Jenks. First, that they (and those of other islands peopled by primitive and modern Malayans, and those of Japan and China) are indigenous—the product of the mountain lands of each isolated area; second, that most of them are due to cultural influences from one center, or possibly more than one center, to the North of Luzon—as influences from China or Japan spreading southward from island to island; third, that they, especially all those of the Islands— excluding only China—are due to influences originating South of the Philippines, spreading northward from island to island. Terracing may be indigenous to many isolated areas where it is found, and doubtless is to some; it is found more or less marked wherever irrigation is or was practiced in ancient or modern agriculture. However, it is believed not to be an original production of the Philippines. Certain it is that it is not a Negrito art, nor does it belong to the Moro or the so-called Christian tribes of the Islands.

Different sections of China have rice terraces, and as early as the XIIIth Century Chinese merchants traded with the Philippines, yet there is no record that they traded North of Manila—where terracing is alone found. Besides, the Chinese record of the early commerce with the Islands—written by Chao Jukua about 1250, it is claimed,—specifically, states that the natives of the Philippines were the merchants, taking the foods from the shore and trading them even to other islands; the Chinese did not pass inland. Even though the Chinese brought phases of his culture to the Islands, it would not have been agriculture, since he did not practice it here. Moreover, whatever culture he did leave would not, according to Dr. Jenks' reasoning, be



SKETCH MAP OF NORTHERN LUZON

* Illustrations, courtesy Ethnological Survey.



BONTOC IGOROTS.—A GLIMPSE OF IGOROT LAND.

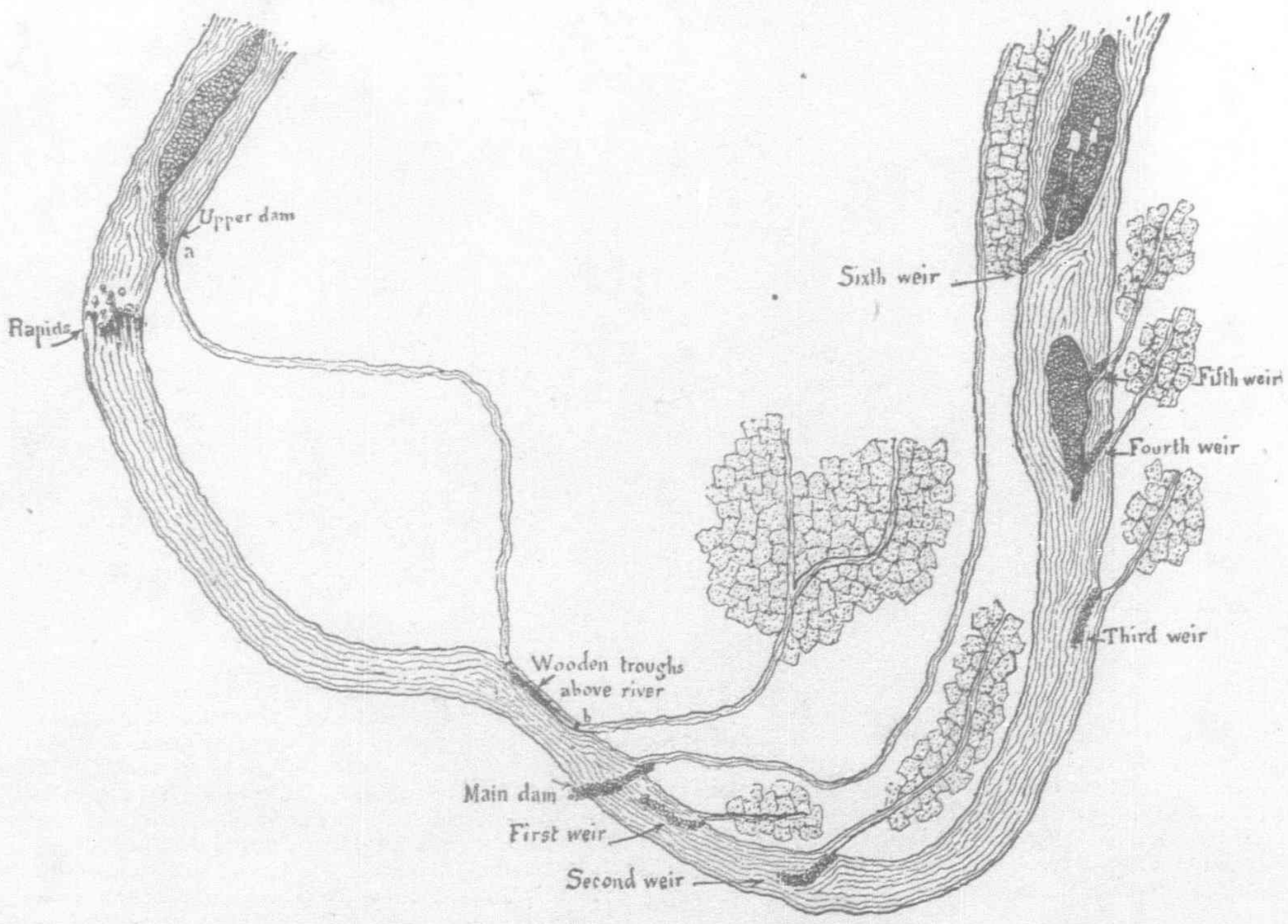
found in the mountains three or four days inland, while the people with whom he traded were without the art. The same argument holds against the Japanese as the inspirers of Igorot terraces. There is no record that they traded in the Islands as early as did the Chinese, and it is safe to say, no matter when they were along the coasts of Luzon, that they never penetrated several days into the mountains, among a wild head-hunting people, for what the agricultural Igorot had to sell.

The historic cultural movements in Malaysia have been not from the North southward but from Sumatra and Java to the North and East; they have followed the migrations of the people. It is believed that the terrace-building culture of the Asiatic islands for the production of mountain rice by irrigation during the dry season has drawn its inspiration from one source, and that such terraces where found today in Java, Lombok, Luzon, Formosa, and Japan are a survival of very early culture which spread from the nest of the primitive Malayan stock and left its mark along the way—doubtless in other islands besides those cited. If Japan, as has Formosa, had an early Malayan culture, as will probably be proved in due time, one should not be surprised to find old rice terraces in the mountains of Batanes Islands and the Loo Choo Islands which lie between Luzon and Japan.

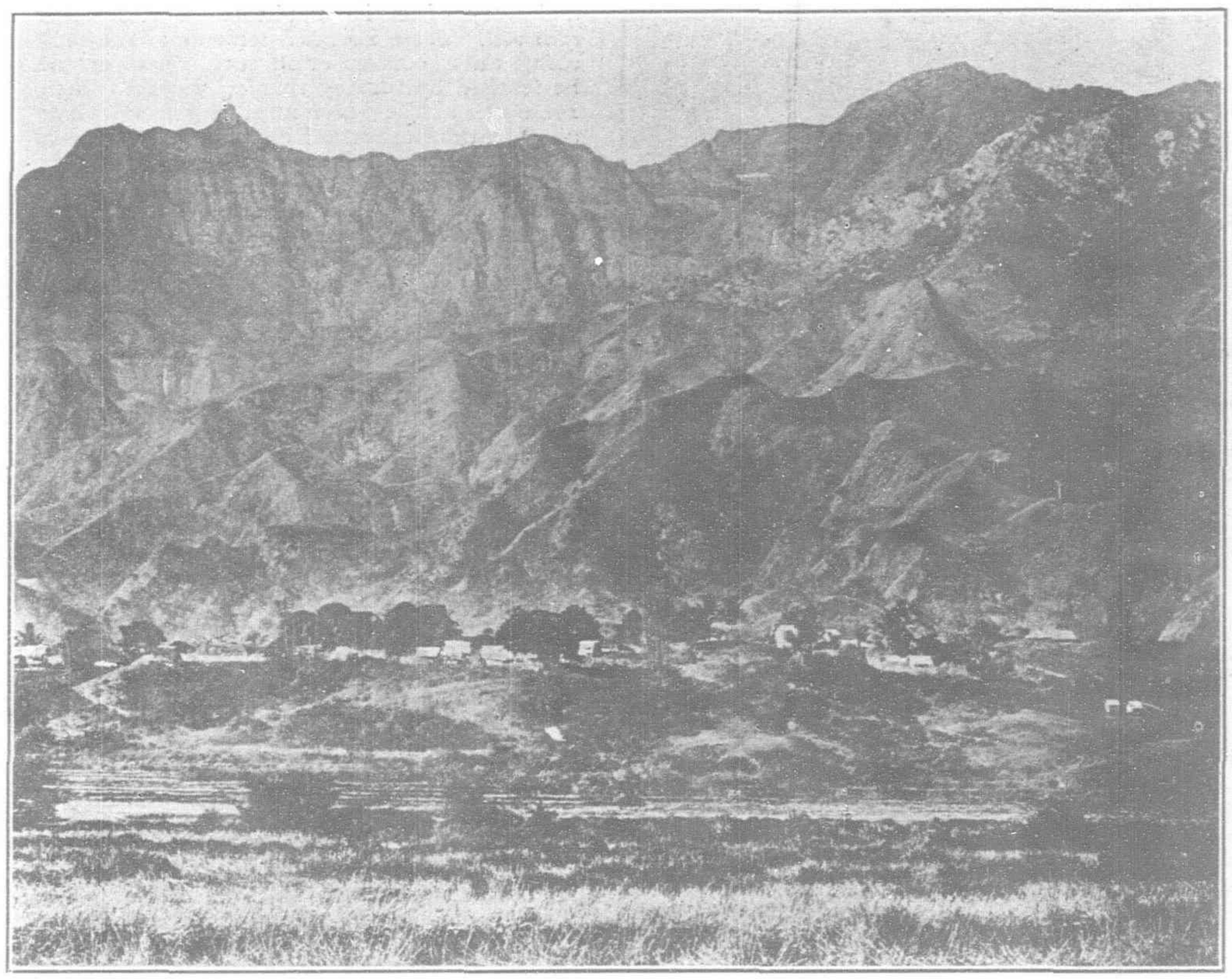
BUILDING THE SEMENTERA.—There are two varieties of sementeras—garden patches, called *pay-yo*—in the Bontoc area, the irrigated and the unirrigated. The irrigated sementeras grow two crops annually, one of rice by irrigation during the dry season and the other of *camotes* (sweet potatoes), grown in the rainy season without irrigation. The unirrigated sementera is of two kinds. One is the mountain or side-hill plat of earth, in which *camotes*, millet, beans, maize, etc., are planted, and the other is the horizontal plat (probably once an irrigated sementera), usually built with low terraces, sometimes lying in the pueblo among the houses, from which shoots are taken for transplanting in the distant sementeras and where *camotes* are grown for the pigs. Sometimes they are along old water courses which no longer flow during the dry season; such are often employed for rice during the rainy season.

The unirrigated mountain-side sementera, called *fo-ag*, is built by simply clearing the trees and brush from a mountain plat. No effort is made to level it and no dike walls are built. Now and then one is hemmed in by a boundary wall.

The irrigated sementeras are built with much care and labor. The earth is first cleared; the soil is carefully removed and placed in a pile; the rocks are dug out; the ground shaped, being excavated and filled until a level results, This task for a man whose only tools are sticks is no slight one. A huge boulder in the ground means hours—often days—of patient, animal-like digging and prying with hands and sticks before it is finally dislodged. When the ground is leveled the soil is put back over the plat, and very often is supplemented with other rich soil. These irrigated sementeras are built along water courses or in such places as can be reached by turning running water to them. Inasmuch as the water must flow from one to another, there are practically no two sementeras on the same level which are irrigated from the same water course. The result is that every plat is upheld on its lower side, and usually on one or both ends, by a terrace wall. Much of the mountain land is well supplied with bowlders and there is an endless water-worn supply in the beds of all streams. All terrace walls are built of these undressed stones piled together without cement or earth. These walls are called *fa-ning*. They are from 1 to 20 and 30 ft. high and from 1 ft. to 18 in. wide at the top. The upper surface of the top layer of stones is quite flat and becomes the path among the sementeras. The toiler ascends and descends among the terraces on stone steps by single rocks projecting from the outside of the wall at regular intervals and at an angle easy of ascent and decent (see illustration "A Terrace Wall"). These stone walls are usually weeded perfectly clean at least once a year, generally at the time the sementera is prepared for transplanting. This work falls to the women (see illustration "Women Weeding a Terrace Wall at Soil-Turning Season"), who commonly perform it entirely nude. At times a scanty frock-and-back apron of leaves is worn tucked under the girdle. In the Banawi District, South of the Bontoc area, there are terrace walls certainly 75 ft. in height, though many of these are not stones, since the earth is of such a nature that it does not readily crumble. It is safe to say that 9|10 of the available water supply of the dry season in the Bontoc area is utilized for irrigation. In some areas, as about Bontoc Pueblo (see illustration "The Entrance to Bontoc Pueblo," etc.), there is practically not a gallon of unused water where there is space for a sementera. A single area consisting of several thousand acres of mountain side is frequently devoted to sementeras, and Dr. Jenks says he has yet to behold a more beautiful view of cultivated land than such an area of Igorot rice terraces. Winding in and out, following every projection, dipping into every pocket of the mountain, the walls ramble along like running things alive. Like giant stairways the terraces lead up and down the mountain side, and, whether the levels are empty, dirt-coated areas, fresh, green-carpeted stairs, or patches of ripening, yellow grain, the beholder is struck with the beauty of the arti-



BONTOC IGOROTS.—RIVER IRRIGATION SCHEME.



BONTOC IGOROTS.—TILUD PASS, EAST SIDE.

ficial landscape and marvels at the industry of an otherwise savage people.

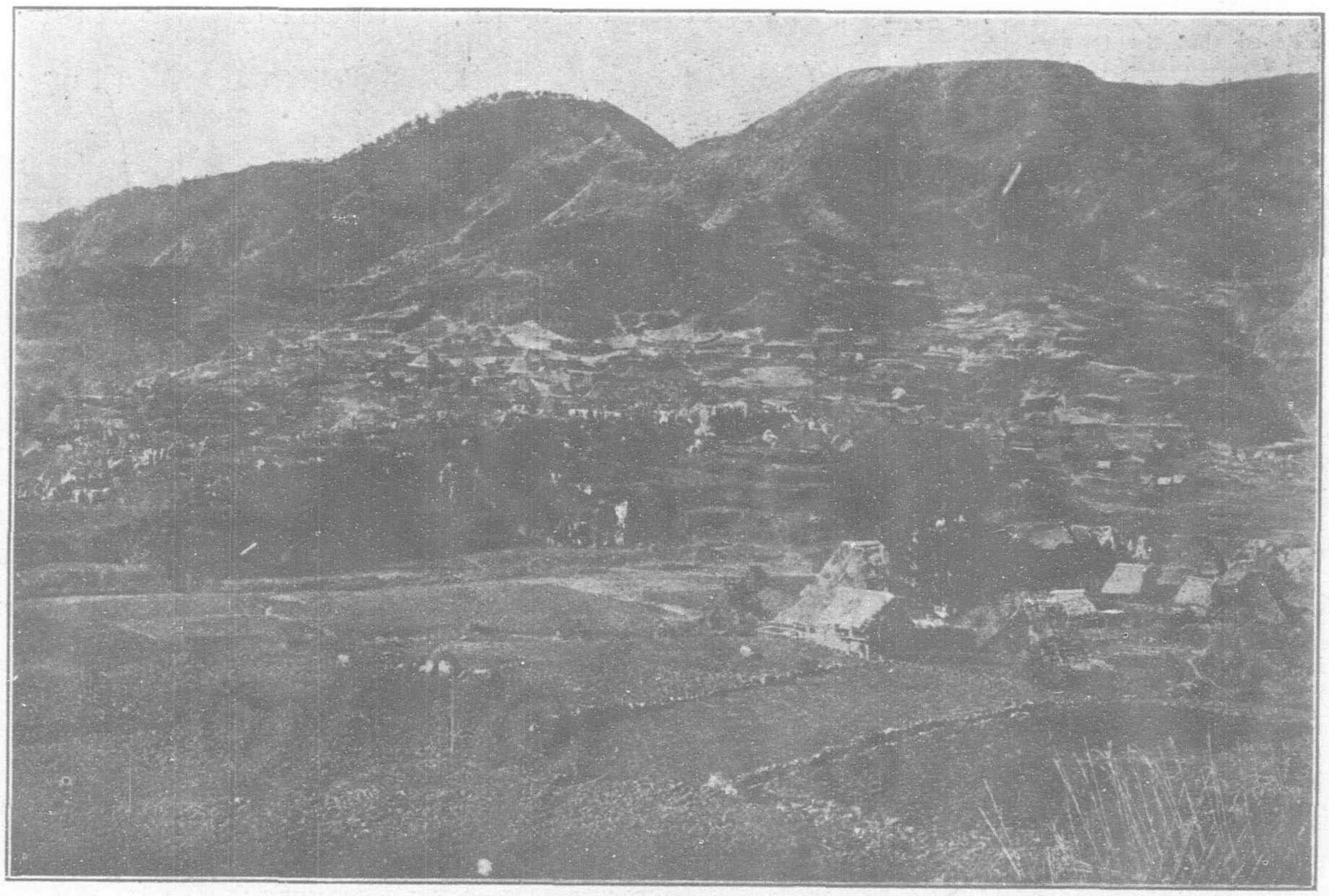
IRRIGATION.—The Igorot employs three methods of irrigation: One, the simplest and most natural, is to build sementeras along a small stream which is turned into the upper sementera and passes from one to another, falling from terrace to terrace until all water is absorbed, evaporated, or all available desirable land is irrigated. Usually such streams are diverted from their courses, and they are often carried long distances out of their natural way. The second method is to divert a part of a river by means of a stone dam. The third method is still more artificial than the preceding—the water is lifted by direct human power from below the sementera and poured to run over the surface.

The first method is the most common, since the mountains in Igorot land are full of small, usually perpetual, streams. There are practically no streams within reach of suitable pueblo sites which are not exhausted by the Igorot agriculturist. Everywhere small streams are carefully guarded and turned wherever there is a square yard of earth that may be made into a rice sementera. Small streams in some cases have been wound for miles around the side of a mountain, passing deep gullies and rivers in wooden troughs or tubes.

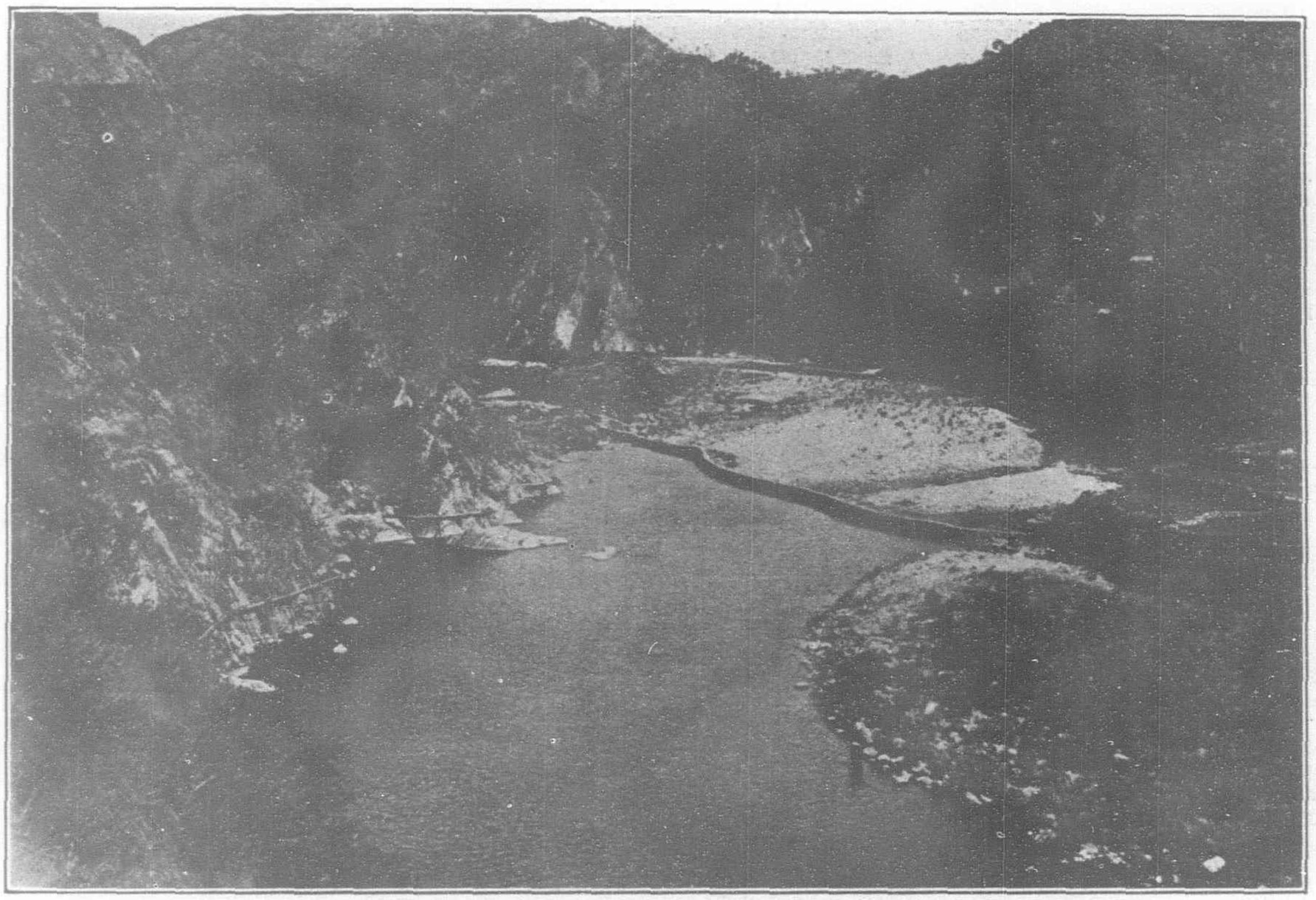
Much land along the river valleys is irrigated by means of dams, called by the Igorot *lung-ud'*. During the season of 1903 there was one dam (see plan "River Irrigation Scheme;" also illustrations "Partial View of Bontoc Irrigating Works" and "The Main Dam, Showing Irrigating Troughs Beyond") across the entire river at Bontoc, throwing all the water which did not leak through the stones into a large canal on the Bontoc side of the valley. Half a mile above this was another dam (called the upper dam in the plan of the "River Irrigation Scheme") diverting one-half of the stream to the same valley, only on to higher ground. Immediately below the main dam were two low piles of stones (designated wiers) jutting into the shallow stream from the Bontoc side, and each gathering sufficient water for a few sementeras. Within a quarter of a mile below the main dam were three other loose, open wiers of rocks, two of which began on a shallow island, throwing water to the Samoki side of the river. In the stream a short distance further down a shallow row of rocks and gravel turned water into three new sementeras constructed early in the year on a gravel island in the river.

The main dam is about 12 ft. high, 2 ft. broad at the top, 8 or 10 ft. at the bottom, and is about 300 ft. long. It is built each year during November and December, and requires the labor of fifteen or twenty men about six weeks. It is constructed of river-worn bowlders piled together without adhesive. The top stones are flat on the upper surface, and the dam is a pathway across the river for the people from the time of its completion until its destruction by the freshets of June and July.

The upper dam is a new piece of primitive engineering. It, with its canal, has been in mind for at least two years; but it was completed only in 1903. The dam is small, extending only half way across the river, and beginning on an island. This dam turns water into a canal averaging 3 ft. wide and carrying about 5 in. of water. The canal, called *á-lak*, is about 3,000 ft. long from the dam at *a* in plan of "River Irrigation Scheme" to the place of discharge into the level area *k* at *b*. For about 530 ft. of this distance it was impossible



BONTOC IGOROTS.—PUEBLO OF SAGADA.

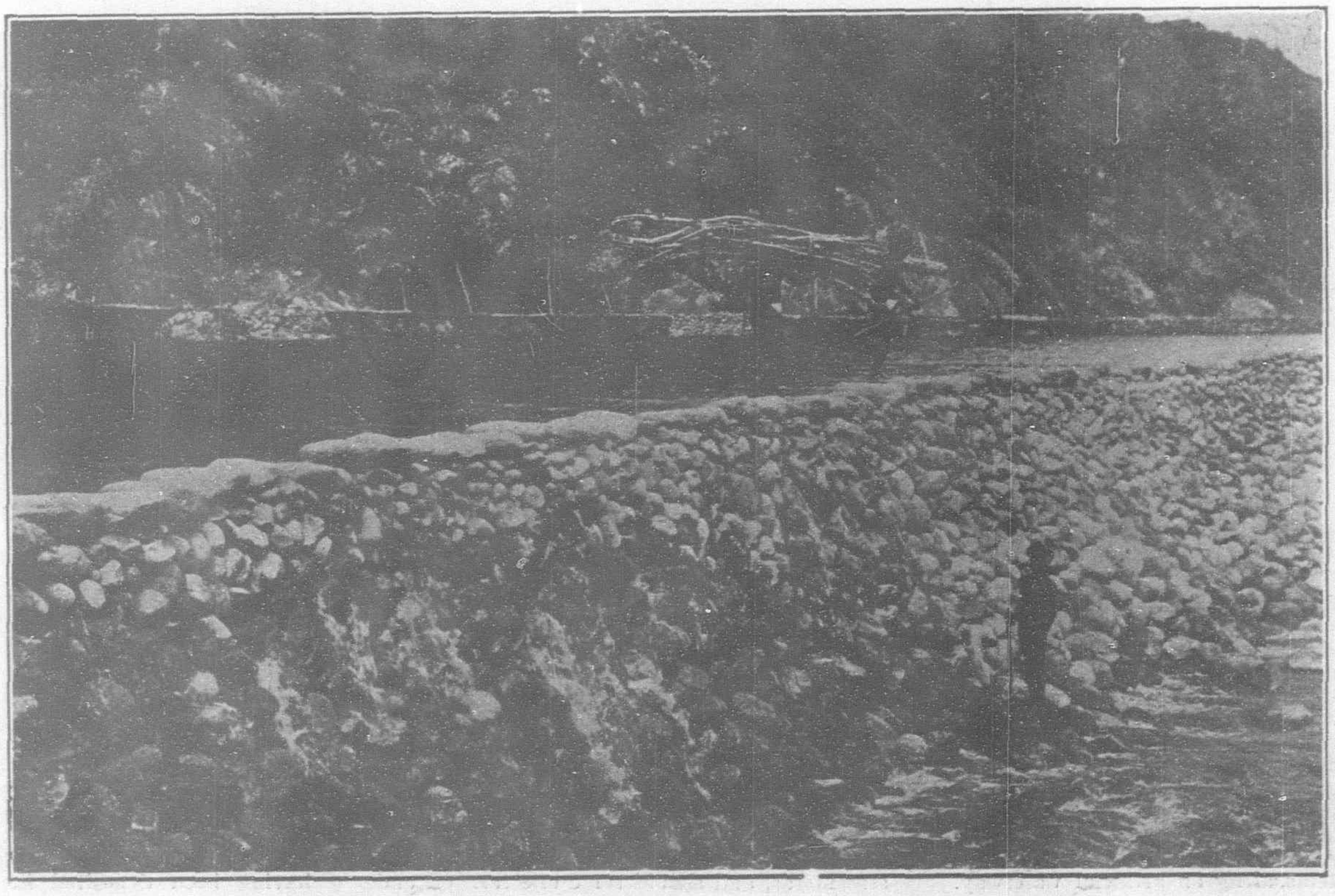


BONTOC IGOROTS.—PARTIAL VIEW OF BONTOC IRRIGATION WORKS.

for the primitive engineer to construct a canal in the earth, as the solid rock of the mountain dips vertically into the river. About fifty sections of large pine trees were brought and hollowed into troughs, called *ta-la'-kan*, which have been secured above the water by means of buttresses, by wooden scaffolding, called *to-kod'*, and by attachment to the overhanging rocks, until there is now a continuous artificial waterway from the dam to the tract of irrigated land.

Considerable engineering sense has been shown and no small amount of labor expended in the construction of this last irrigating scheme. The pine logs are a foot or more in diameter, and have a waterway dug in them about 10 or 12 in. deep and wide. These trees were felled and the troughs dug with the wasay, a short-handled tool with an iron blade only an inch or an inch and a half wide, and convertible alike into ax and adz.

There seems to be a fall of about 22 ft. between *a* at the upper dam and *b* at the discharge from the troughs. This estimate was obtained by a primitive surveying outfit as follows: A rifle, with a bottle attached, used for a liquid level, was sighted from a camera tripod. A measuring tape attached to the tripod showed the distance of the rifle above the surface of the water. A surveyor's tape measured the distance between the tripod and the leveling rod, which also had an attached tape to show the distance of the point sighted above the surface of the water. The strength of the scaffolding supporting the troughs is suggested by the statement that the troughs were brimming full of swift-running water, while the "surveying" party of four adults, accompanied by half a dozen juvenile Igorot sightseers, weighed about 900 pounds, and was often distributed along in the troughs, which they waded within a space of 30 ft.



BONTOC IGOROTS.—THE MAIN DAM, SHOWING IRRIGATION TROUGHS BEYOND.

This fall in a distance of about 3,000 ft. seems needlessly great; however, the primitive engineer has shown excellent judgment in the matter. First, by putting the dam (upper dam) where it is, only half the stream had to be built across. Second, there is a rapids immediately below the dam, and, had the Igorot built his dam below the rapids, a dam of the same height would have raised the water to a much lower level; this would have necessitated a canal probably 10 or 12 ft. deep instead of three. Third, the height of the water at the upper dam has enabled him to lay the log section of the waterway above the high-water mark of

BONTOC IGOROTS.—THE ENTRANCE TO BONTOC PUEBLO, SHOWING SYSTEM OF RICE SEMENTERAS.

the river, thus, probably, insuring more or less permanence. Had the dam been built much lower down the stream the troughs would have been near the surface of the river and been torn away annually by the freshets, or the people would be obliged each year to tear down and reconstruct that part of the canal. As it now is it is probable that only the short dam will need to be rebuilt each year.

All dams and irrigating canals are built directly by or at the expense of the persons benefited by the water. Water is never rented to persons with sementeras along an artificial waterway. If a person refuses to bear his share of the labor of construction and maintenance his sementeras must lie idle for lack of water.

All sementera owners along a waterway, whether it is natural or artificial, meet and agree in regard to the division of the water. If there is an abundance, all open and close their sluice gates when they please. When there is not sufficient water for this, a division is made—usually each person takes all the water during a certain period of time. This scheme is supposed to be the best, since the flow should be sufficient fully to flood the entire plat—a 100-gal. flow in two hours is considered much better than an equal flow in two days.

During the irrigating season, if there is lack of water, it becomes necessary for each sementera owner to guard his water rights against other persons on the same creek or canal. If a man sleeps in his house during the period in which his sementeras are supposed to receive water, it is pretty certain that his supply will be stolen, and, since he was not on guard, he has no redress. But should sleep chance to overtake him in his tirescme watch at the sementeras, and should some one turn off and steal his water, the theif will get clubbed if caught, and will forfeit his own share of water when his next period arrives.

The third method of irrigation—lifting the water by direct human power—is not much employed by the Igorot. In the vicinity of Bontoc pueblo there are a few sementeras which were never in a position to be irrigated by running water. They are called *pay-yo' a kao-u'-chan*, and, when planted with rice in the dry season, need to be constantly tended by toilers who bring water to them in pots from the river, creeks, or canals. On the Samoki side of the valley during a week or so of the driest weather in May, 1903, there were four "well sweeps," each with a 5-gal. kerosone-oil can attached, operating nearly all day, pouring water from a canal into sementeras through 60 or 80 ft. of small, wooden troughs.

IMPROVEMENT OF PORT AND RIVER

(Concluded from page 64.)

have been deposited, completing the rip-rap mound to low water and 1,530 ft. of the superstructure. 5,589,333.8 cub. yds. of material have been dredged; 4,880,937.3 cub. yds. having been deposited in the space behind the bulkhead, filling it to the proposed grade; about 1,500,000 is to be deposited behind a bulkhead in front of the Luneta, and about 400,000 cub. yds. deposited on the existing fill to bring it to an elevation of about ten ft. after settlement, and for a rip-rap foundation of a pier extending from the outer end of the E. breakwater 1000 ft. at right angles to the bulkhead, which is required to prevent the flow of mud into the dredged area, and which can be utilized for a portion of the wharf system of the port.

The building of a concrete foundation for the light-house at the outer end of the W. breakwater has also been included in the contract.

701,323.5 cub. yds. in the moat around the Walled City and in the low ground S. of the City Hall; and 7,093 cub. yds. in Engineer Island.

The 5,000,000 cub. yds. of dredging provided for in the original contract has not been sufficient to complete the excavation of the proposed harbor, due principally to the expansion of the material when measured in fill.

By Act 1360 dated June 26th, 1905, the Philippine Commission has authorized the entering into contract with the Atlantic, Gulf and Pacific Company for the excavation of about 2,000,000 cub. yds. additional of which

Plans and specifications have also been prepared by this office for the construction of a timber wharf 500x50 ft. in the outer harbor, and one 313x25 ft. in the inner basin for the use of the Quartermaster's Department, U. S. Army, which are to be built from funds appropriated by the United States Government.

These plans have been prepared by Assistant Engineer H. C. DeLano, who has had local charge of the work since October, 1904.

MANILA SHIPPING, 1899-1905.—The following statement of the entrance and clearance of vessels by fiscal years since American occupation has been furnished by the Collector of Customs for the Philippine Islands:

MANILA, COASTWISE.

	ENTERED.		CLEARED.	
Year	Vessels	Tonnage	Vessels	Tonnage
1899	583	149,129	723	165,161
1900	1,280	240,897	1,310	255,104
1901	1,792	341,853	1,831	354,940
1902	1,660	308,571	1,742	359,859
1903	2,022	388,468	2,045	389,255
1904	2,102	441,830	2,116	435,201
1905*	1,976	425,434	1,990	428,643

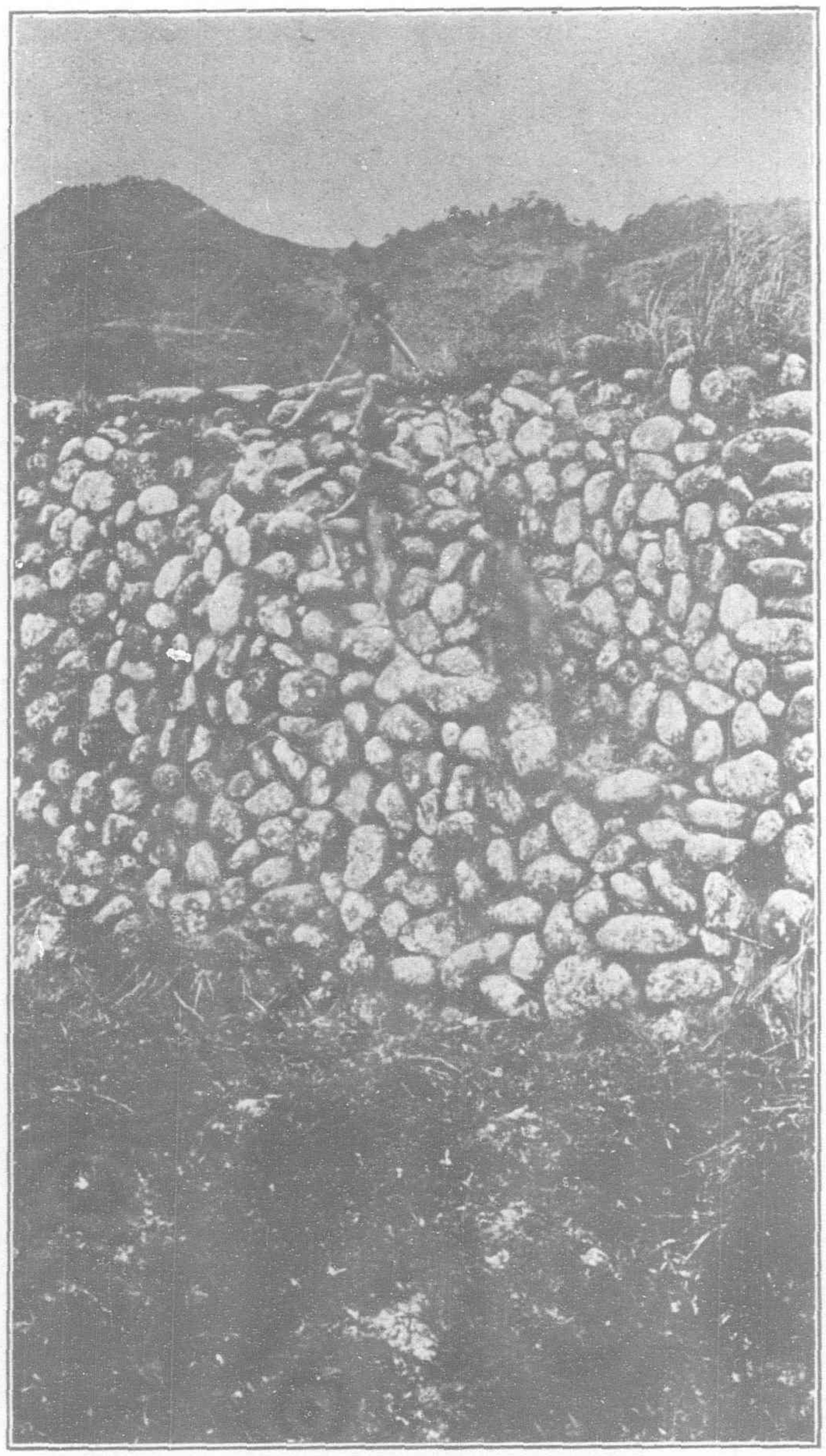
MANILA, FOREIGN.

1899	232	260,545	288	291,649
1900	412	542,058	545	501,522
1901	521	814,241	460	762,930
1902	577	912,982	514	881,985
1903	662	1,179,349	649	1,198,957
1904	635	1,247,959	643	1,222,356
1905*	579	1,112,938	578	1,005,638

PASIG RIVER.—The existing project proposes to maintain by dredging an 18-ft. channel at mean low water across the bar up the river as far as the Bridge of Spain, and a 6-ft. channel through the upper river, at the lowest stage of Laguna de Bay.

* Month of June estimated.

BONTOC IGOROTS.—PANAWI RICE SEMENTERAS.



BONTOC IGOROTS.—A TERRACE WALL.

At the time of American occupation there was about 12 ft. at mean low water on the bar and the channel was obstructed by a number of sunken vessels. This office received from the Spanish Government for use on the work 4 launches, 6 dump scows, 1 water boat and 1 barge, all of which were in bad condition and have had to be rebuilt.

To obtain and maintain the 18 ft. channel has required the dredging of 1,726,610 cub. yds. of material to the close of the last fiscal year. During the present fiscal year 478,705 cub. yds. have been dredged. For several years it was necessary to employ the entire plant on the work, but the channel can now be maintained by the use of one dredge.

The upper Pasig River is an important channel of commerce between Manila and the other towns located on its banks and on Laguna de Bay. According to Spanish reports there was originally a depth of but 12 to 14 in. at low water on bars obstructing the various outlets to the Laguna, and of only from 14 to 16 in. on bars further down stream.

The disturbing influence in the regimen of the river is the Mariquina River which empties into the Pasig at the town of Pasig and during floods brings down large quantities of sediment which is deposited not only in the lower river, but also in the Laguna itself and has created a delta formation in the lake similar to the one it has formed in Manila Bay.

Between 1886 and 1896 the Spanish authorities materially improved navigation by cutting a canal and rectifying the river for about half a mile above the mouth of the Mariquina, and by closing numerous side channels so as to make the branch of the river passing the town of Napindan the principal outlet to the lake.

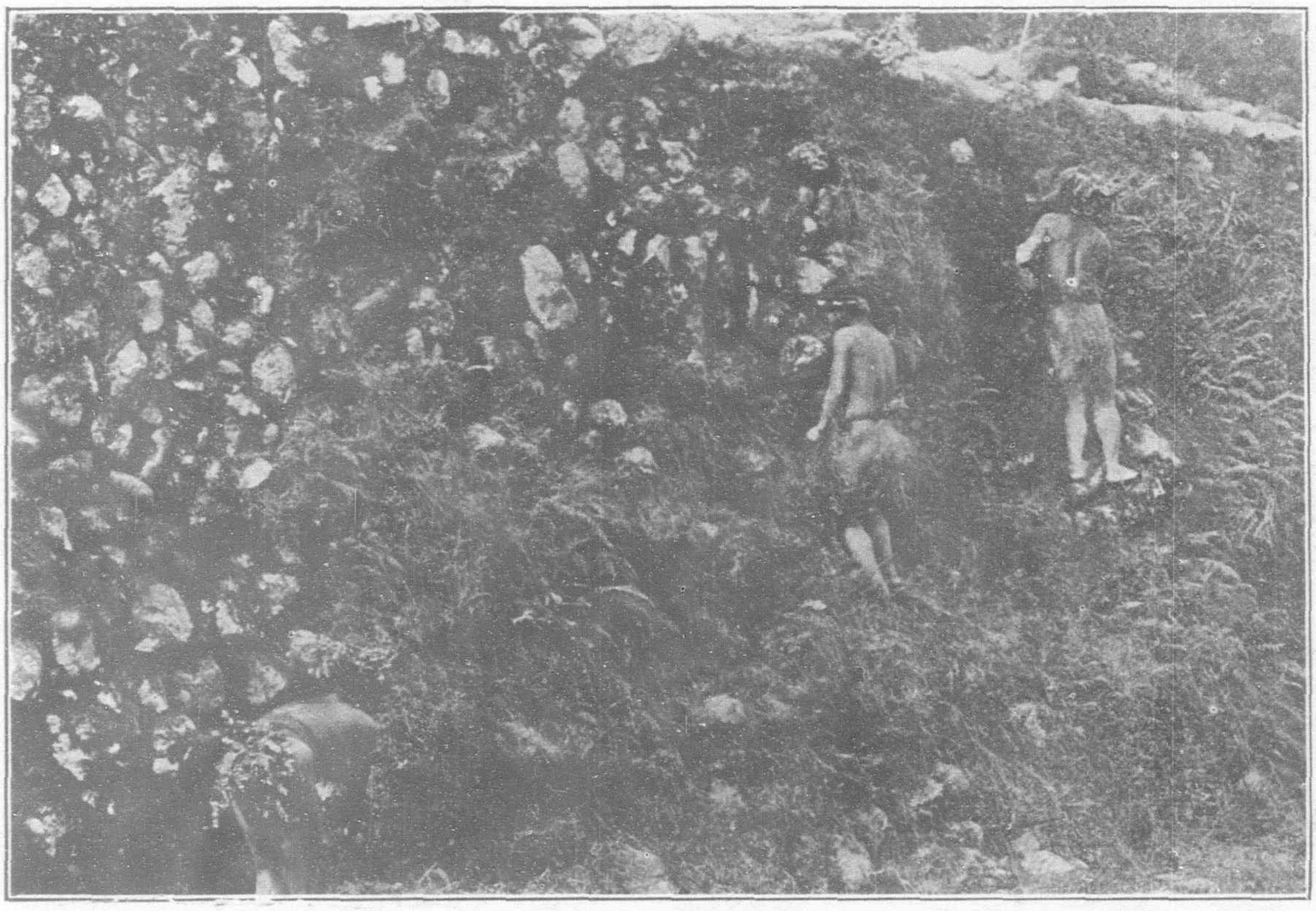
During the low water of 1900 there was a clear channel depth of 4 ft.

When this office took charge of the work the only dredges available for the upper Pasig were two Preistman and one bucket dredge of a capacity of from 80 to 100 cub. yds. each per day. A dipper dredge and a suction dredge have been constructed for the work, and during the fiscal year ending June 30, 1904, dredged 150,421 cub. yds., maintaining a channel of 5½ ft. depth at low water through the upper river.

During the present fiscal year 33,358 cub. yds. have been dredged for maintaining navigation, but the suction dredge has also been employed in pumping gravel from the river for the surfacing of the Santa Ana-Fort Wm. McKinley Road, the cost of which has been paid from the appropriation for roads and bridges. Below the mouth of the Mariquina River, the river has been contracted for a distance of about 2,000 ft. by the construction of wing walls and the shore revetted for a distance of 1232 ft. The wing walls were constructed of rip-rap obtained from the Fort Wm. McKinley reservation and the revetment consisted of a bamboo mat sunk with stone.

SANTA CRUZ ESTERO.—By Act No. 1114, 9,656.00 pesos was appropriated for dredging the Santa Cruz Estero, which was increased to $10,000.00 by resolution of the commission by allotment from funds appropriated for the transportation of the constabulary. The project provides for dredging a 4-ft. channel from the Pasig river to the constabulary storehouses, a distance of about 2700 ft. Work was begun in April, 1904, with a small Preistman dredge. At the close of the fiscal year about 2300 ft. of the channel had been excavated, 17,400 cub. yds. of material having been removed. A pavement of brick, stone and tile, which had gradually accumulated rendered the dredging difficult, as the Preistman dredge is not well adapted to removing such material. The narrowness of the estero and the small clearance under the bridges also delay operations, it being necessary at every bridge to dismantle the plant, to get under the obstruction, and then to reassemble it before renewing work.

The material excavated has been generally used to fill in the grounds around the buildings of the Bureau of Coast Guard Transportation on Engineer Island. At the current prices for earth fill the saving to the Bureau of Coast Guard and Transportation, by this fill, exceeds the cost to the constabulary for the excavation. While a large commerce in cascoes and bancas



BONTOC IGOROTS.—WOMEN WEAVING A TERRACE WALL AT SOIL-TURNING SEASON.

has already been benefited by this improvement, an extension of the work to the juncture with the Binondo Canal, a distance of about 900 ft., is extremely desirable. A further extension to Paseo Azcarraga would afford a cheap means for transportation to the heart of the city of products arriving on the Manila and Dagupan Railroad. By deepening the estero to Palumpang, connection would be made with the Bitas River, and with a large internal water system E. of Manila Bay. A considerable commerce at present seeks this channel though limited to transportation in bancas and rafts which can only be moved at high tide. As the business of the city is largely based on transportation by cascoes, the development of the esteros has an importance that would not exist in American towns.

REPAIRS TO PASIG RIVER WALLS.—The balance of P4,829.59 remaining at the close of the last fiscal year of the allotment by Act 885 for the repairs to Pasig River walls has been expended in pointing up the face of the wall, resetting coping stones that had become loose, and setting cannons for mooring posts. The section of wall near the Anda Monument which was damaged during the flood of July, 1904, was also repaired. The improvement of the Pasig River, of Santa Cruz Estero, and the repairs to the Pasig River walls, have been in local charge of Assistant Engineer James E. Ainsworth.

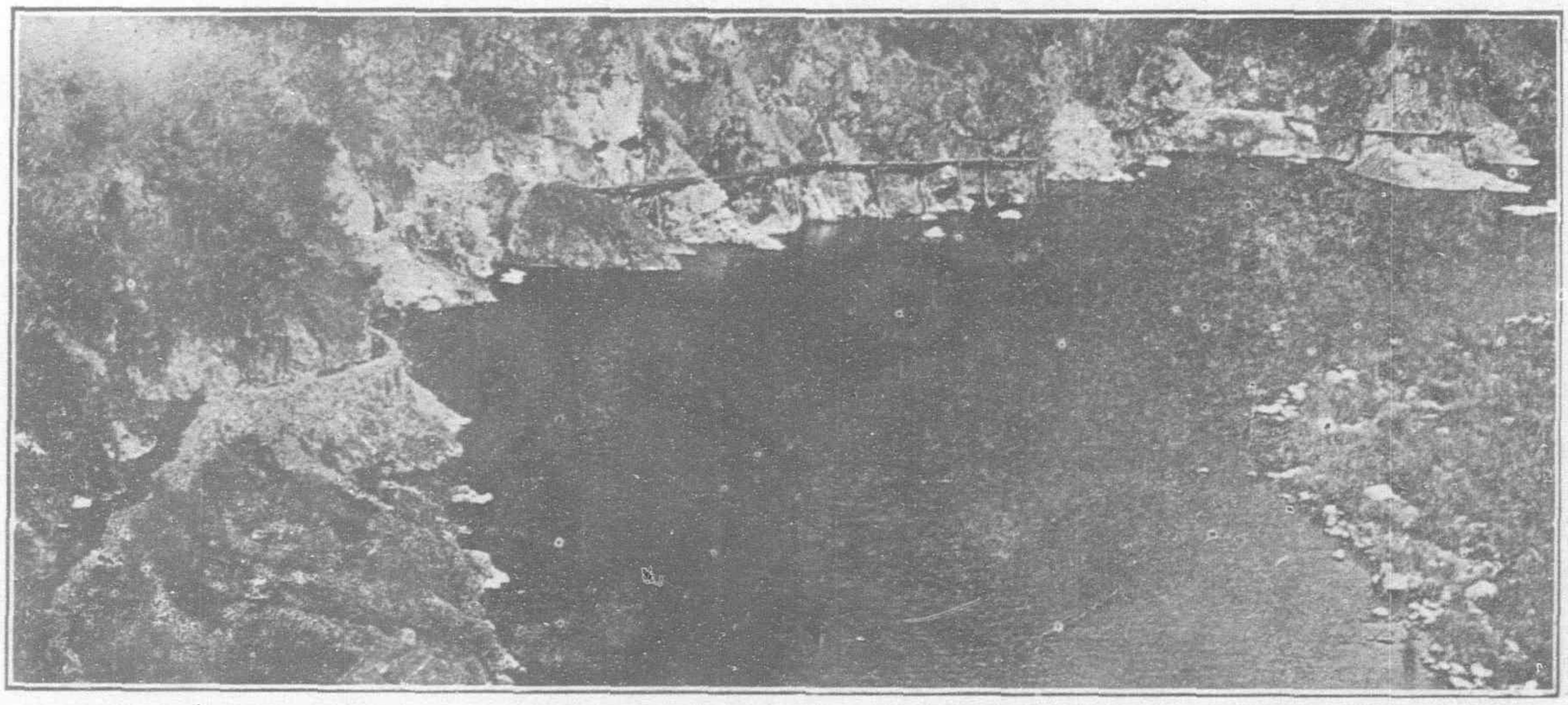
REVOLUTION IN CABLE CODES.

THE PANTELEGRAPHY CODE SYSTEM.

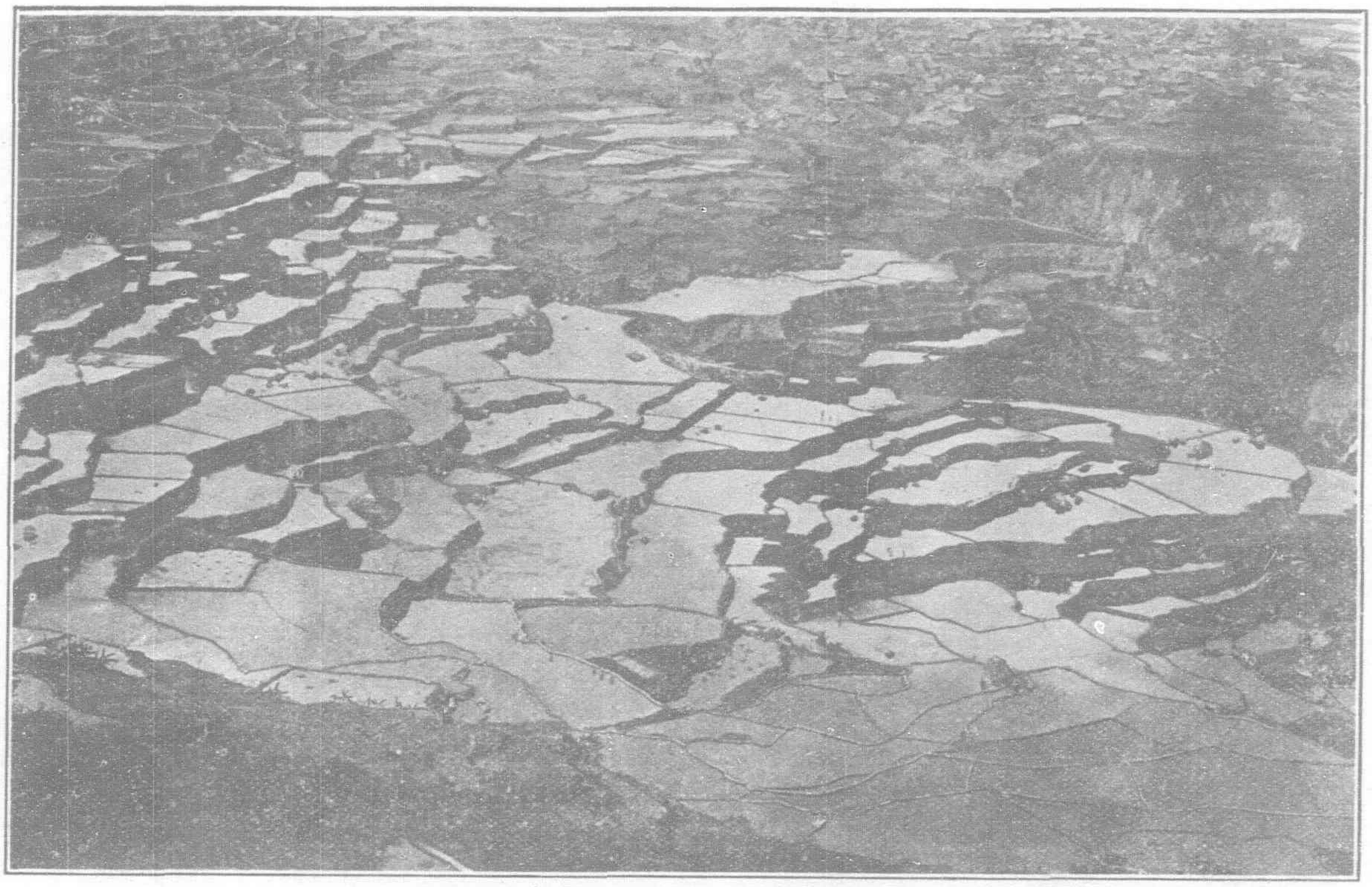
In these days of small margins anything that tends to minimize the working expenses of a business is worthy of consideration. In this connection the following particulars regarding the above code system will prove of interest:—

Pantelegraphy is the scientific application of the latest regulations issued by the International Telegraph Conference, i. e., that in the construction of codes any words may be used which are of artificial construction so long as they consist of not more than ten letters and are of pronounceable syllables.

COMBINATION PHRASE CODE VYBO.—Everyone has experienced the difficulty when working from the old phrase codes of finding a phrase to convey the exact meaning required—the phrases provided either expressing too much or too little. For instance, if one wishes to indicate doubt that his correspondent is correct, the old phrase codes provide nothing better than some bald statement as "You are wrong," whereas by pantelegraphy it would be just as easy to telegraph "Surely you must be mistaken." This difficulty is entirely overcome by the Combination Phrase Code VYBO. It provides for *every word* a specific group of letters so that any phrase desired can be immediately compressed into telegraphic form simply by writing down the letters representing the words of that phrase and cabling the



BONTOC IGOROTS.—IRRIGATION DITCH WHICH FEEDS TROUGHS SECURED TO MOUNTAIN SIDE SHOWN AT THE LEFT.



BONTOC IGOROTS.—RICE SEMENTERAS AT TRANSPLANTING SEASON.

result in words of ten letters. Actually VYBO is the entire dictionary codified in a very handy, simple, and economical manner. It is possible by this code to telegraph any phrases or names entirely in the code. For example this article could be easily transmitted word for word wholly in code.

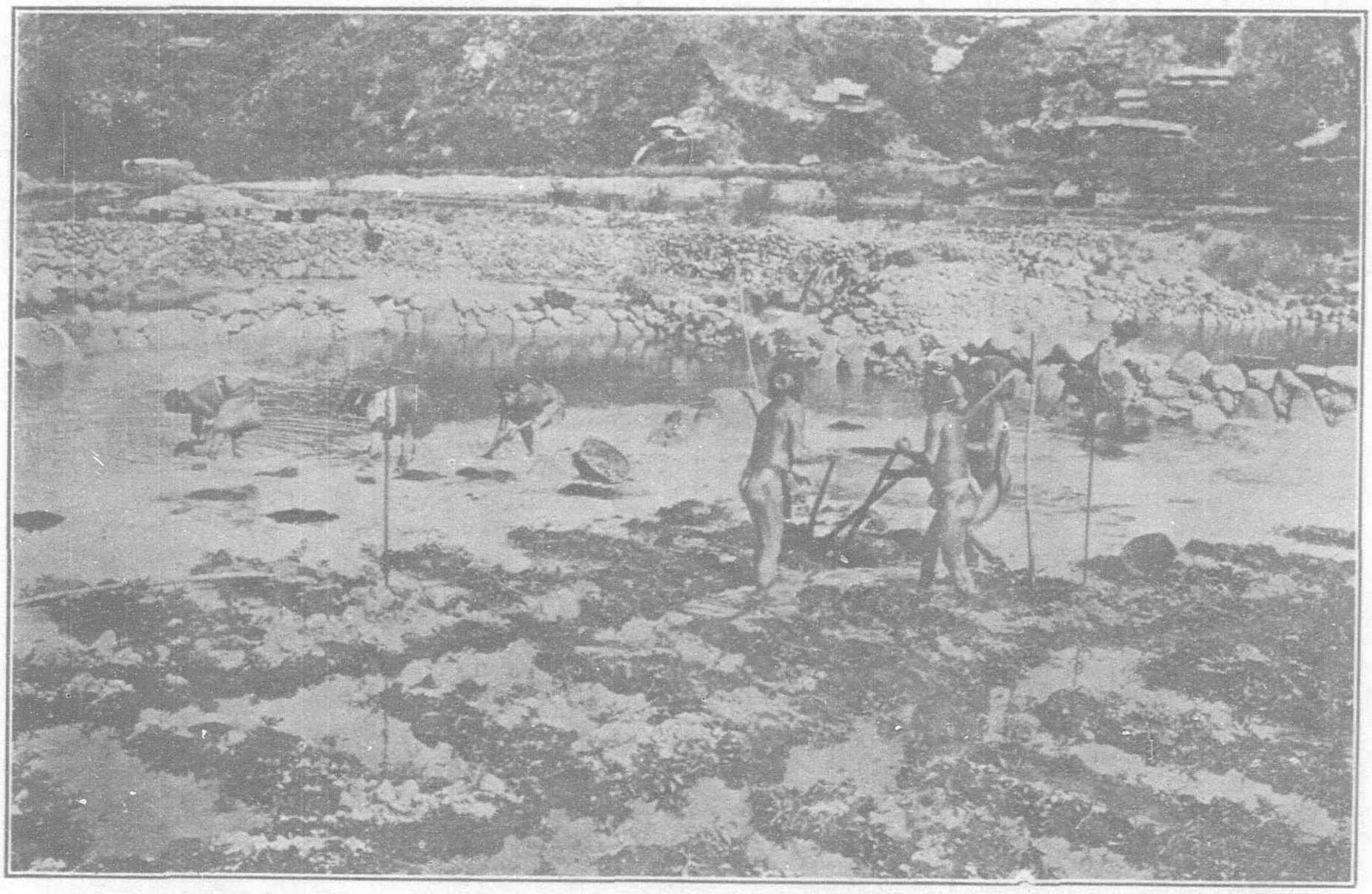
PANTELEGRAPHY TRANSLATING CARD.—This portion of the system is intended for application to the old figure and phrase codes. By its use it is possible to wire any *two words* from such codes as the A. 1., A. B. C., Western Union, Whitelaw's 400,000, etc., as *one word* —an immediate saving of 50 per cent.

The Pantelegraphy Translating Card provides two sets each of ten thousand million (10,000,000,000) perfectly pronounceable and euphonious words, which renders it the equivalent of a *double ten figure code.*

When applied to figure codes any *ten figures*, or two groups of five figures, can be telegraphed in *one word*, any five groups of six figures as three words and so on.

It is worthy of note that the committee of the London Lloyds has just decided to furnish all their principal agents throughout the world with copies of the Pantelegraphy Combination Phrase Code, and that in future all ships mentioned in "*Lloyds' Weekly Shipping Index*," and similar publications, will be prefaced by a pantelegraphy code cypher for the convenience of users of this system—a striking testimony to the merits of the system.

Further particulars of this unique time and money saver can be obtained from the Pantelegraphy Publishing Company, Ltd., British post office box 170, Shanghai, or 20 Copthall Avenue, London.



BONTOC IGOROTS.—TURNING SOIL IN A WATER-FILLED SEMENTERA, SHOWING WOMEN TRANSPLANTING RICE.

FAR EASTERN ENGINEERING AND CONSTRUCTION NEWS

RAILWAYS, SUPPLIES, ETC.

F. M. S. Railway Locomotives—The Federated Malay States Railway has, as a part of its equipment, sixty-three serviceable locomotives.

Maintenance of Way, Madras Railway.—The cost of maintaining a mile of single track, including sidings, on the Madras Railway for six months is about Rs. 961.16.

Hankow-Canton Line.—There is a report afloat on the China Coast to the effect that on the payment of Tls. 7,000 000 the Hankow-Canton Railway may be restored to the Chinese.

French Concession, Kwangsi Province, China—France is now endeavoring to secure a concession for the building of a railway in Kwangsi Province, from Lung-chow to Kwei-lin *via* Liu-chow. The British Minister to China is said to be opposing the concession.

Stretinsk-Habarovsk Line.—The Russian Government is reported to intend laying a line of railway from Stretinsk to Habarovsk along the Amur, as originally planned, for which the easier line through Manchuria was afterwards substituted.

Malacca Railway, S. S.—It is understood that the Legislative Council of the Straits Settlements has approved of the transfer to the Government of the Federated Malay States of the Malacca-Pulau-Sebang Railway on payment by the government of the capital cost of the construction.

Yokohama-Hacchioji Extension.—The directors of this Japanese railway have decided to extend the line from the Keihin Station at Kanagawa to the foreshore at that place by building the railway on the reclaimed land there. Car shops, factories and the main office of the company will also be constructed at the end of the extension.

Perak (F. M. S.) Railways.—The length of open line from Prai in Province Wellesley to Tanjong Malim, on the Selangor border, and of the short line from Taping to Port Weld, gives a total mileage of railways in this state of 213, with forty-four stations opened to traffic. The capital account of the railways exceeds $19,000,000 and the addition thereto in 1904 was $250,000. Receipts amounted to $2,057,000. The line is well maintained.

Railways of Japan, 1904.—At various times in 1904 the ordinary railway traffic suffered from movements of troops, but the railways themselves profited, and they show increased earnings for the period under review. Two hundred and fifty-eight miles of railway were opened to traffic during the year, as compared with 211 miles in 1903, the total mileage now being 4,491 miles, of which government lines account for 1,345 miles.—*British Consular Report.*

Seoul-Fusan Railway.—The Seoul-Fusan Railway Company, which was compelled to erect the Fusan station at Tsuanriong owing to the British Consulate point being midway between that place and a convenient point in the Port of Fusan, has reached a satisfactory understanding with the British authorities. The company will remove the British Government building to another site at its own expense and extend the railway as far as a certain place selected for that purpose, facing Fusan Harbor.

American Freight Cars, Japan.—An order has just been closed with the American Car and Foundry Company for 1,000 freight cars for the Japanese Government. The cars are to be of the gondola type, with steel underframes and with a capacity of 20 tons. It is understood that the order was divided equally between the Japanese Government purchasing agents, Messrs. Mitsui & Co., and Messrs. Okura & Co. Shipment is to be made as early as the order can be filled.

Railway Extension, Negri Sembilan, F. M. S.—A survey of a possible extension of the railway system of this state has been made from a point on the Gemas River near Bukit Bantan, following along the South bank of the Muar River past Batu Bersawah where it crosses to the North bank of the Muar, past Kuala Jempol, and on through the Serting District, probably to be continued thence through the undeveloped and, except for aborigines, as yet uninhabited portion of the state near Pasoh, to, it is believed, Kuala Semantan in Pahang.

Locomotives for Japan.—The principal features noticeable in the trade in locomotives (1904) are a large increase in imports from the United Kingdom, a corresponding decrease from the United States and a big jump in the imports from Germany. It is interesting to note that during the past year the British type of locomotive obtained the preference, and that all the German locomotives and many of those from America recently imported or still on order are of British type and standards. So far as price goes, the three countries seem to compete on about equal terms. Germany now requires the longest time for manufacture, while there has been little to choose between the United Kingdom and the United States in this particular.—*British Consular Report.*

Negri Sembilan (F. M. S.) Railways.—The total length of this line, which has already been surveyed, from Seremban to the Negri Sembilan border at the Gemas River, is 63 miles. The progress on earthwork shows that out of a total of 4,294,432 cubic yards in the whole length of the line, 3,083,000 had been completed and excavated by the end of the fiscal year, of which 2,421,965 were during 1905. Out of a total of 300 bridges and culverts, 191 have been completed and 52 more are in progress. Nineteen miles of permanent way were linked in, and at the end of December 1904 all sleepers necessary for the line as far as Tampin—about 96,000 in number—have been delivered from the forests of Negri Sembilan. Level crossings and road deviations have been completed up to the 50th mile. The telegraph has been completed up to Tampin and is in progress of erection up to the 46th mile. All stations and buildings have been completed up to Tampin and are in progress along the remainder of the line.

Federated Malay States Railways.—The total expenditure on construction and survey of new lines including $90,330 for the Johore line, amounted in 1904 to $2,898,949, all of which was met by surplus revenue funds. If to this be added the sums expended on the Malacca-Pulau-Sebang Railway and the extension to Singapore, both of which are being carried out by the Federated Malay States Railway Department on behalf of the colony, the total expenditure on construction amounted to $3,844,119—to which, perhaps, should also be added the expenditure on the new central workshops, new central offices, and other special services, making a gross total of $4,897,081. The extensions in hand during the year were the Negri Sembilan extension from Seremban towards Malacca, now completed to Tampin; the Batu Caves, extension, the object of which is stated to be the transport of ballast to the main line and which also joins up the new central workshop with Kuala Lumpur; the survey from the Gemas River on the borders of Pahang to Kuala Semantan, 72 miles, of which 19 miles of field work and 15 miles of plans and sections were practically completed by the end of the year, and the Johore extension, about 120 miles, the survey of which began early in the year and preparations for construction started at the end of the year. The survey was completed and good progress made with the construction of the Malacca-Pulau-Sebang line, 21 miles, which will be finished in the course of the year.

ELECTRIC LIGHTING, TRACTION, POWER, ETC.

Tokyo Electric Railway Extension.—The line of this corporation has just been extended from Ochanomizu to Manseibashi.

Traction, Hongkong.—It is proposed to use a gas-producer power plant for the operation of the new Peak Tramway at Hongkong.

Bangkok Electric Car Service.—The new electric cars for the Bangkok (Siam) lines, have been tested with success, the power being supplied for the nonce from the plant of the Siam Electricity Company. The tramway company is issuing Tcs. 200,000 of share warrants and debentures.

Oriental Telephone and Electric Company.—This concern will authorize the creation of debenture stock to the amount of £200,000 to provide for the reconstruction and extension of the installations, to comply with the requirements of the Governments of India, the Straits Settlements and Hongkong.

Large Contractors for Japan.—Contracts amounting to fully $5,000,000 gold, calling for the shipment with all despatch, of electrical equipment, machines and tools, have been placed in the American market on Japanese account. The orders are mostly closed by the New York representatives of Japanese firms. The machinery is for installation in the principal government shipbuilding yards and arsenals.

Aerial Ropeway, Hongkong.—An aerial ropeway is being constructed by the military authorities at Hongkong for the purpose of conveying ammunition, etc., from the landing wharf in the harbor to the magazines on the hill. The tresties are of iron lattice columns in concrete foundations and the car sits load about two tons. It is intended to continue the line up to the new military hospital at an early date. A similar ropeway is in active operation at the dairy farm on the S. side of the island, transporting loads from the sea level up to the farm at Pok-fo-lum.

Hongkong Electric Company Ltd.—The manager of this company reports that on June 1st. last, the number of lamps, fans motors connected to the concern's supply service was equivalent to upwards of 34,500 lamps of 8 c. p. Eighty-five arc lamps are maintained and 15 electric lifts are being operated by the power service. During the year a 250-kw. steam alternator was erected at the company's works, and an improved motor generator has been fitted for use in connection with the power service. A new chimney is now in course of construction at the works.

Electric Lighting, Canton, China.—Messrs. Shewan, Tomes & Co., of Hongkong have entered into an agreement with the taotai of Canton whereby it shall enjoy an electric lighting monopoly of the city for a term of years. The company shall illuminate the yamens of the viceroy and governor at half price and other yamens and government colleges shall be charged two-thirds of the original price. On the first five days of every year and on the occasion of the anniversary of the birthdays of their majesties, the Empress-Dowager, and Emperor and Empress Hwong Hsu, the company shall supply 200 lights free of charge. At the expiration of the present term, it shall be at the option of the firm as to renewal or otherwise of the agreement.

Messrs. Germann & Co., Ltd, Manila, P. I.—This enterprising firm has recently again enlarged the premises of its engineering department. A splendid large separate sales and exposition room has been added to the mechanical and electrical shop. Escolta No. 100, rear building, which has already been found too small to attend to all the orders in a prompt and efficient manner. The very complete assortment of all classes of electrical apparatus, machineries and fixtures, always stocked, enables this firm to accept any contracts of any kind of electrical and mechanical works; also to attend to every sort of repairs in this line of business. Owing to the great variety of their goods in stock, Messrs. Germann & Co. were the only people of this branch to accept recently a very important repair contract for the whole electric installation on board the Imperial Russian ships *Oleg* and *Zemtchug*, now lying in Manila Harbor, which work will be completed in forty-five days from the date of the contract.

WATERWORKS AND IRRIGATION

Japanese Plant at Yingkow.—The Japanese residents of this city have decided to construct a waterworks system at Yingkow. The water is to be brought from the upper reaches of the Liao River, and the works will be large enough to supply 60,000 persons.

Krian (F. M. S.) Irrigation.—In regard to the Krian irrigation works estimated to cost $1,600,000, progress in 1904, though disappointing on account of deficiency in the labor supply, was satisfactory insofar that it included laying pipes for the syphon crossing of Kurua River, a difficult operation; completion of banks from the intake to this point (about 3½ miles) for the greater portion of which it was necessary to transport material by trucks and locomotives; completion of the spill weir and closing of the Merah River channel, and completion of the Tanjong Piandang, Titi Serong and Alor Pongsu channels, and of the regulators at Bagan Seari and head of the Selinsing branch canal.

Seremban (F. M. S.) Water Supply.—This scheme, which has been roughly estimated to cost $175,000, is reported to be well under way. Seven-in. wrought-iron spirally-riveted pipes are to be used, and the first shipment has arrived in Singapore. A retaining reservoir is to be constructed 7¼ miles from the service reservoir on Gun Hill in Seremban, on the slopes of Gunong Angsi, where possibly a storage reservoir may also be required. The survey for the system has been practically completed and the scheme is to bring the water from Sungei Simin, rising on the slopes of Gunong Angsi, in 7-in. pipes to a service reservoir on Gun Hill, from which water can be supplied to the consumers by gravitation.

BUILDINGS.

Bank of Japan, Hiroshima.—The building for the Hiroshima Agency of the Bank of Japan, now in course of construction, has been thrown open to business. Mr. Bunzaburo Watanabe is manager of the new agency.

Building Operations, Straits Settlements.—According to a Singapore paper building operations are going on steadily in the Straits Settlements, North and South. In Singapore most of the hotels are in splints and new wings are being added. In the suburbs it is next to impossible to rent a decent house and these are regarded signs of prosperity. Mr Towkay Loke Yew, a wealthy resident, has introduced an up-to-date office building known as Winchester House. It is located on Collyer Quay, is on London lines, contains several dozen offices, and is to be fitted with electric light and the first elevator seen in Singapore.

Chief Court Buildings, Rangoon.—The Public Works Department of Burma is advertising for tenders for the construction of the whole of the new Chief Court Buildings at Rangoon. Bids will be opened at the office of the Executive Engineer, Construction Division, Rangoon, September 4th. The estimated cost of the buildings is Rs. 13,07,636. Particulars of the estimates:—Main Chief Court building, including sanitary works, Rs. 11,75,736; stable and carriage shed with peons' and durwans' quarters, Rs. 28,138; refreshment room for natives with married and single men's quarters, Rs. 21,619; lean-to roof of native refreshment room, Rs. 2,808; stable and carriage shed with European refreshment room, Rs. 9,425; latrine, bathing shed, official assignee and bailiff's auction room warehouse, sweepers' quarters, sanitary appliances (for 2-9) quarters, cast iron railings, gates, roads, culverts and wooden fencing making up the balance.

BRIDGES.

Maizuru Railway, Japan.—The temporary bridges and embankments in this line, which had been constructed in haste are being replaced by substantial structures. The improvement will be finished by the end of the present year.

Binondo (Manila, P. I.) Lift Bridge.—The whole material for this structure, consigned to Messrs. Germann & Co., Ltd., Manila, has arrived and been discharged, but the immediate erection with which the firm intended to proceed at once is necessarily to be delayed owing to the city not having prepared the foundations in due time.

PUBLIC WORKS.

Federated Malay States Improvements.—The magnitude of some of the improvements in the hands of the Public Works Department may be judged from the following list:—Krian irrigation, $1,609,000; Negri Sembilan-Pahang trunk road, $1,235,400; Kuala Lumpur electric light, $880,000; Guides cantonments, $225,000; Seremban waterworks, $175,000, town hall at

Kuala Lumpur, $100,000; postoffice building at Kuala Lumpur, $100,000; central school, $98,000; Kampar waterworks, $75,000; Selangor museum, $50,000; astana at Sri Menanti, $45,000.

PERAK (F. M. S.) PUBLIC WORKS.—The gross expenditure on public works in this state during 1904, according to the resident's annual report just issued, was $2,179,000. These works were carried out by a staff the sum total of whose personal emoluments amounted to $108,000, which bears a relation of about 5 per cent to the expenditure. The annually recurrent works cost $727,000, while the new works undertaken, and wholly or partly executed, came to $1,250,000. Excellent progress was made with the Kriau irrigation works on which $214,000 were expended. The largest building was the central school at Taiping. The cantonments of the Malay States Guides were vigorously pushed forward and the whole regiment, with the exception of one company at Penang, is now quartered in Taiping.

PORT WORKS, DREDGING, DOCKS, ETC.

MAIZURU, HARBOR, JAPAN.—The harbor improvements now under way at this port will be finished by the end of the current year.

DOCK EXTENSION, FOOCHOW.—The Wai Wu Pu at Peking has agreed to a foreign loan of Tls. 3,000,000 for the extension of the Foochow dockyard.

DOCKING CONSTRUCTION, JAPAN.—Docking construction is active in Japan. Two new dry docks are to be constructed at Moji, one 480 ft. and the other 600 ft. in length. The big floating dock built at Nagasaki for Kobe has been successfully tested by docking the *Fukura-maru*.

"DREDGER" AT SHANGHAI.—The Dutch dredger, *Dredger*, arrived recently at Shanghai from Flushing, Holland, Singapore being her last port of call. She is a suction dredger working on what is said to be an entirely new principle, and it is claimed she can pump more than two of the ordinary dredgers new in use. If the dredger comes up to expectations she will be taken over by Messrs Butterfield & Swire, who will use her in dredging at their Pootung wharves, or wherever she may be required. She had a most successful trip from Holland being 108 days on the voyage, out of which she was three weeks at Port Said.

SINGAPORE HARBOR IMPROVEMENTS.—Several months ago THE FAR EASTERN REVIEW published the plans and report of Messrs. Coode, Son & Matthews on the proposed improvement of Singapore Harbor. Now these same engineers come forward with another report in reply to criticisms on their design for the works. In this they state that the advantages which appear to them as being claimable following up the construction of the proposed works are as follows: —(1.) The inner road and those portions of the harbor which are adjacent to the shore, would be sheltered at all times and under all conditions of wind and weather.—(2.) The necessity for the construction of an independent boat harbor would be removed. —(3.) The transfer of the traffic, due to the berthage of inter-colonial steamers at a sheltered quay, such as that proposed at Telok Ayer, would greatly relieve the congested condition of the river.—(4.) The erection of godowns on the new reclamation, especially arranged to meet the altered conditions of traffic, and in close proximity to the steamers, would considerably facilitate the handling of cargoes.—(5.) The proposed quay would be connected with the railway system of the island and also with Tanjong Pagar.—(6.) Ample accommodation would be provided to meet present requirements, and means afforded for extension hereafter if desired, either by further deepening the sheltered area by dredging, or by forming additional berthage by jetties or further quayage.—(7.) Before improvement works at Kalang Basin, such as described in our former report, could be carried out, similar shelter to that contemplated by the proposed works would be necessary. The Kalang Basin improvements could therefore be undertaken hereafter, without futher cost on sheltering works, when it is considered that the time has arrived for the execution of the same. A further advantage to which we have referred herein may be claimed, as to the shelter afforded to Singapore River and to the traffic carried on between craft lying in the roads and Kalang Basin.

MINES AND MINING.

COPPER OUTPUT, JAPAN.—Japan's output of copper in 1904 was 34,850 tons as against 31,360 tons in 1903.

NEGRI SEMBILAN (F. M. S.) MINING.—At Membau, below Rasah on the Linggi River, an important mining camp has sprung up.

MACHIDA COAL MINE FLOODED.—The Machida coal mine, Japan, owned by the Iwaki Colliery Company, has become flooded, owing to a sudden inrush of water, and work has been partially suspended for the time being

MINING LANDS, F. M. S.—The total area of mining land held under alienation in the Federated Malay States, is roughly, 219,000 acres, exclusive of Pahang. The total area is about 229,000 acres. The amount of land alienated during 1904 was 29,891 acres.

BUA MINING COMPANY, LTD., BAGUIO, BENGUET, P. I.—Mr. Leonard Lehlbach, mining engineer, manager of the Bua Mining Company, Ltd., is pushing work of this Company's Benguet (Luzon) property, and THE FAR EASTERN REVIEW hopes to give a more detailed account of this company's property at an early date.

SELANGOR (F. M. S.) MINES.—Between Rawang and Serendah a new mining station has been opened. In the Kuala Lumpur District deep mines are being opened up on the old worked-out shallow fields, and modern plants are being erected. At Kajang, a field for long more or less dispised, three rich mines have been opened up.

MINES IN MONGOLIA.—The Peking Government has decided to despatch officials to Mongolia to study the mines there and report upon same in an effort to interest native gentry to undertake their operation. Those mines which have been privately sold to foreigners will be confiscated by the government and those who sold the ground without authority will be severely punished.

PAHANG (F. M. S.) TIN MINES.—The Pahang Administration Report for 1904, just issued, shows that the Kuantan mining district is making great strides and the mines opening up in the Blat promise to become important. They exported 4,384 piculs of alluvial tin during the year. The Pahang Corporation exported 4,921 piculs of lode tin, and the Pahang Kabang 1,782 piculs. There are twenty-six lodes on the holdings of the Pahang Corporation and Pahang Kabang.

PHOSPHORUS DEPOSIT, JAPAN.—A rich deposit of phosphorus has been discovered at Hainoura, Nanao Bay, Noto Province, Japan, and a merchant of Osaka has obtained a concession covering 3,630,000 *tsubo*. The deposit extends under the sea in a layer of 30 ft., and the ore contains 60 per cent of the mineral. The concessionaire intends to establish a factory at Nanao for manufacturing manure from the phosphorus.

NEW GOLD MINING COMPANY, JAPAN.—A new gold mining company named the Hakko Kinzan Kaisha has been organized in Yokohama by Messrs Taisuke Miura, Sakuhei Iwata, and others, with a capital of Y-5,0,000. The company intends to work an extensive mine and diggings in Hak o-zan, a mountain range of Fukushima Perfecture. In the experimental boring, 20, or 30 mommée of gold have been daily obtained.

PERAK (F. M. S.) TIN OUTPUT.—Perak continues the premier producer of tin in the Federated Malay States, according to the annual report of the senior warden, Mr. Dykes. The mines at Tronoh and Tambun still continue their prosperous career, and further development of the deposits at these mines has justified the managers in employing further labor-saving machinery. At Papan fine machinery has been erected by the Pusing Lama Company, and on the adjoining block Mr. Osborne is about to erect a fine new modern plant. The hydrauiic companies around Gopeng still continue to do well.

KOLAR GOLD FIELDS, INDIA.—Following are the returns for the month of June, 1905: Balaghat.—3,950 tons of quartz crushed yielded 3,157 oz., and 2,750 tons of tailings cyanided yielded 269 oz., making a total of 3,426 oz. of gold as compared with 3,402 oz. in May. Champion Reef.—Milled 19,150 tons which produced 15,799 oz., 13,494 tons of Tailings treated by the cyanide process produced 1,902 oz., and scalings from No. 2 mill plates 691 oz., making a total of 18,410 oz of gold, as compared with 18,104 oz. in May. Hutti (Nizam's) —1,164 oz. of gold from 2,050 tons of quartz crushed. Mysore.—16,250 tons of quartz crushed produced 15,367 oz., and 13,653 tons of tailings cyanided yielded 1,684 oz., making a total production of 17,051 oz. of gold as compared with 16,976 oz. in May Mysore West.—Mill ran 674 hours, crushed 2,295 tons which yielded 1,027 oz. of bar gold. Nandydroog.—6,650 tons of quartz crushed yielded 5,536 oz. and 7,020 tons of tailings treated by the cyanide process yielded 618 oz., making a total of 6,154 oz. of gold, as compared with 612 oz. in May. Ooregum.—Stuff crushed 10,011 tons gold produced 4,338 oz and slimes and tailings cyanided 10,201 tons gold produced 1,147 oz., making a total return of 5,485 oz, as compared with 5,483 oz. in May.

PAHANG (F. M. S.) GOLD OUTPUT.—The export of gold from Pahang in 1904, according to the administration report just issued, was 18,004 oz. as compared with 12,411 oz. in 1903, an increase of 5,593 oz Of this quantity 3113 oz. really belonged to 1903, but the duty was only paid in 1904. The following table shows the output from the principal mines:—

Mine.	Tons crushed.	Ounces gold	Average yield dwts.
Raub Company	37,472	7,197	3.84
Malaysian Co	10,829	3,669	6.77
Kechau Gold Mining Syndicate	2,053	569	5.50
Kechau Gold Fields	2,212	909	8.15
Penjum	2,395	281	2.34
Total.	54,961	12,625	4 57

In addition to this, 136 oz. of alluvial gold were washed out of the tin in Bentong; 10 oz. were exported as the result of prospecting done by the Tokkai Syndicate; 2,115 oz. were won from 11,350 tons of sands by the Selensing Company by the cyanide process. The royalty on the year's output, including that paid on 3,118 oz. exported last year, was $25,426; $475 was paid as commuted royalty by alluvial workers in the Lipis district. The labor force employed in the gold mines is about 900 coolies, besides a few Malays working alluvial ground. Labor-saving machinery of 960 h. p., equivalent to a labor force of 7,680 men, is also employed. At the end of 1904, 77,000 acres of mining land were held under permanent titles in the state; this was increased to 79,440 acres at the end of year under review. These figures do not include the unascertained area of the Liang Concession; nor do they include the concessions of the Pahang Corporation and of Towkay Loke Yew, both in the Kuantan District. One of the large concessions, that for 50 sq. m. at Penjum, was cancelled in September, owing to non-compliance by the lessees with the conditions of their lease. Theft of gold from the mines still continues, but not to any great extent, and ten cases were disposed of by the magistrates during the year, four at Raub and six at Lipis.

F. M. S GOLD MINING.—The total value of gold exported from the Federated Malay States in 1904, according to a report just issued, amounted to about £80,600, the quantity being 15,157 oz. The quantities obtained from the actual crushings were as follows. —Pahang, tons crushed 54,961 with output of 12,625 oz.; Negri Sembilan, tons crushed 3,438 with output of 2,189 oz. Total, tons crushed 58,399, gold obtained 14,814 oz. In addition to this amount 146 oz. were won from alluvial workings and 2,115 oz. from 11,350 tons of tailings by the cyanide process. The output from the chief mines in Pahang and Negri Sembilan was as follows:

	Tons crushed	Ounces.
Raub Australian	37,472	7,197
Malaysian Company	10,820	3,669
Kechau Syndicate	2,053	569
Kechau Gold Fields	2,212	909
Penjom	2,395	281
Batu Bersawth	3,438	2,189
Total	58,399	14,84

AUSTRALIAN RAUB GOLD MINING PROPERTY, F. M. S.—The annual report of the directors of the Australian Raub Gold Mining company, Ltd., shows that during the year ended March 31st, 1905, the concern only succeeded in keeping its "head above water" Returns deminished perceptibly from the previous year's average of 5 dwt., and while the future looks quite clear with the innovation of the tailings treatment of the ore, economy must be the watchword. However, there is a large quantity of surface and shallow ground which can be profitably worked. *Labor*—This feature of the mining operations during the period under consideration was satisfactory—plentiful, healthy, thriving, industrious and contented. The coolies worked very cheap. *Timber and Firewood.*—The company still has abundant supplies of both the hard and soft building woods, mine poles and slabs, and firewood, within the limits of the concession. Its average monthly consumption of mine timber costs $500, and lately it has been using four or five times that amount for new construction work. The firewood bill has been reduced from over $2,000 per month to between $250 and $300 since the extended application of electric power, and it will be futher curtailed when the new plant is finished. *Power.*—What has been said in the foregoing emphasizes the value of the company's water power and electric transmission plant at Sempam. The average monthly cost of generating and transmitting electric current, including salaries, wages, and stores, but not depreciation, has been about $1,300. The effective h. p. employed (including lighting) has been gradually increased during the year from 100 to 200, and soon there will be an additional 50 h. p. in use. At 200 h. p. the cost per month works out at about 86½ or 87 per h. p., per annum. which is much the same as the lowest figures in Europe. *New Main Shaft, Bukit Koman.*—One of the considerations which led up to this scheme was a desire on the part of the government to test whether payable gold could be found at depths much exceeding those in which all previous gold mining in the Federated Malay States had invariably This led to the Pahang Government contributing to the cost and stipulating that the shaft should be sunk to 1,500 ft. When it began to look as if at 440 ft. little or no paying stone would be encountered, work on the new shaft was suspended. *Plant and Machinery.*—The installation of new plant and machinery again made great inroads on the company's capital during the year principally in connection with the extension of the electric motive power and the cyanidation of tailings. At Sempam a new turbine and generator capable of delivering 300 h. p. at the mine has been added. At Bukit Koman the new electric hoist is in operation, and during the year the electrically driven Cornish pump, the first and only of its kind in the whole world, was put to work and is running beautifully without a moment's stop. It makes a saving of a least $1,000 per month in fuel. To enable ore-rasing to be confined within certain hours, and thus admit of all the other work of the mine being done through the one shaft, automatically tipping skips have been substituted for the old cage and truck system. The electric cable was also carried down the shaft, thus giving continuous and abundant light at all stations

Pahang.—The Raub Australian Company's Bukit Koman shaft is now down to 455 ft. and the bottom levels have been driven at 440 ft. The stone at this level carries very little gold however. An arrangement was entered into with the Government by this company for sinking a deep shaft to 1,500 ft. The company has, since driving on the 440 ft level at Bukit Koman, come to the conclusion that it is inadvisable to incur any further expenditure on sinking this joint shaft. The Malaysian Company's mine at Bukit Malacca was taken over by Raub Australian Company during the year. On this property the Malaysian Company had sunk a new shaft to a depth of 150 ft. This company started to work alluvian gold at Sepan, near Budu, and laid down a fine hydraulic installation. The results of its operations were most unsatisfactory, and it has since stopped work and removed its plant. The Selinsing Company has done no work on its land, with the exception of treating tailings. These are now finished and no work at all is being done. The Penjom Company stopped work entirely during the year and its concession has reverted to the state. Kechau Gold Fields and the Kechau Syndicate towards the close of the year decided to amalgamate, and these properties will be worked by the Kechau Gold Fields. The number of laborers employed by all the companies at the mines was roughly 900.—*Negri Sembilan.*—The Batu Bersawah Company has sunk a new main shaft to 156 ft. and further sinking will be proceeded with when the new machinery is erected. The company during the year worked under considerable difficulties owing to the fact that it was unable to keep the old shaft dry and at the same time wind stone The year 1905 will see a great step in the further development of this property and from past results the prospects are hopeful. The labor force employed is about 250.

—*General*.—With the exception of a few ounces of alluvial gold from Perak, that state and Selangor are non-producers. The year under review, as far as Pahang is concerned, is the gloomiest one for years. The Government has done its best to assist the industry as far as possible. Kechau Gold Fields with Government assistance is developing two lodes and erecting machinery with a view to exploitation at the deeper level.

SHIPBUILDING, MARINE, ETC.

SS. "CHEANG CHEW."—This steamer has been sold to a German firm of Singapore.

STEAMER "KIAN ANN."—The steamer *Kian Ann* has been sold at Singapore by Messrs. Powell and Co., to Wee Bin and Co. for $15,000.

SALE OF STEAMSHIP "SULTANA."—The British steamer *Sultana* has been sold at public auction by Messrs. Powell and Co., Singapore, for $12,500.

SIAMESE STEAMER "MEDUSA."—This vessel has been sold to Japanese owners for $75,000 and handed over in Kobe. For many years she was in the Bangkok-Singapore trade.

"CHING PING" UNDERGOING REPAIRS.—The Chinese Engineering and Mining company's steamer *Ching Ping*, is undergoing extensive repairs at the Kiangnan Arsenal Dock.

"ELLEN RICKMERS" SOLD.—Rickmers have sold their steamer *Ellen-Rickmers* to the Hamburg-America Line. She has been renamed the *Liberia*, and is about due in the Far East.

STEAMER "YUENWO" REPAIRS.—Messrs. S. C. Farnham, Boyd & Co., Ltd., are the successful tenderers for the steamer *Yuenwo*, which was recently burned on the Yangtsze and towed down to Shanghai.

"IKI-MARU" LAUNCHED.—The steamer *Iki-maru*, 1,500 tons, built for the Sanyo Railway Company to run between Japan and Fusan, has been launched at the Mitsu Bishi Dockyards, Nagasaki. She is of 1,800 h. p.

STEAMER "KENILWORTH" DOCKED.—The steamer *Kenilworth*, from Manila, has been put on the docks at Kowloon to undergo extensive repairs, after the completion of which she will sail for Australia.

"ROHILLA-MARU" SINKS.—The steamer *Rohilla-maru*, owned by the Oshiro Steamship Company of Tokyo, struck a sunken rock at Nasamiseto, near Idzukushima recently, and when the crew left the vessel it was making water rapidly.

SUCCESSFUL TRIAL TRIP.—The river steamer *Tafoo-maru*, formerly the *Tahung-maru*, which has been reconstructed by Messrs. S. C. Farnham, Boyd & Co., Limited, Shanghai, for the owners, the Osaka Shosen Kaisha, recently has a most successful trial trip.

NOVEL AIR-COMPRESSING PLANT.—A large air-compressing plant has been sent from Hongkong to the wreck of the French cruiser *Sully*. It is intended to drill the rock which protrudes through the ship's bottom so as to enable the vessel to be lifted clear by means of the pontoon already on the spot. Much interest is being evinced in this most important salvage attempt of recent years.

MISCELLANEOUS.

NEW CANAL FOR JAPAN.—A canal is to be dug between Nagoya and Atsuta, Japan.

SPINNING MILLS, JAPAN.—Like those in China, the spinning mills in Japan have had a good half-year.

CABLE RATES TO JAPAN.—The Pacific Commercial Cable Company announces a reduction of 20 cents per word in the rate from the United States to Japan. This rate went into effect July 1st.

JAPAN'S FOREIGN TRADE, FIRST HALF-YEAR, 1905.—The general figures of Japan's foreign trade during the first half of the current year are as follows:—Exports,-Y-142,099,000; imports,-Y-283,949,000.

PERAK (F. M. S.) FORESTS.—The plantations under the care of the Forest Department are five in number costing in 1904 the sum of $10,700. The output for the year was 33,000 tons of timber, 106,000 tons of firewood and over 20,000 tons of charcoal.

FORESTRY IN THE YALU VALLEY.—Mr. Imagawa, an expert on forestry, accompanied by more than ten graduates from the Nara School of Forestry, are *en route* from Japan to the Basin of the Yalu to investigate the timber felling business there.

STANDARD OIL IN RANGOON.—The Lieutenant-Governor of Burma has refused an application by the Standard Oil Company of New York for a license for the storage of petroleum in bulk on a site on the Rangoon River and for permission to erect a refinery close to the site designated.

MANILA MACHINERY AGENCY.—The Huber Manufacturing Company of Marion, Ohio, manufacturers of agricultural machinery, has appointed Messrs. C. R. Duffin & Co., agents at Manila for its Far Eastern Business. The same concern also represents the Blymyer Iron Works Company.—*Commercial America*.

TECHNICAL COLLEGE, (F. M. S.)—This institution towards the establishment of which Towkay Loke Yew made a donation of $30,000, is reported to be in a fair way of being started on a sound footing. Selangor alone has promised $20,000 in subscriptions, while Perak and Negri Sembilan are yet to hear from. An engineer to take charge of the school has been employed in England.

ROAD-MAKING MACHINERY.—Messrs. Julian Scholl & Co., of New York City, have filled orders recently for road-making machinery for concerns in Hawaii. The firm makes the "Universal" steam rollers, for which no foreign market has been sought heretofore. The need of road-making machinery in the Philippines has been brought to the attention of this firm of late, and it is thought orders will result from inquiries received.—*Commercial America*.

STRAITS SETTLEMENTS TRADE, 1904.—The annual report on the Straits Settlements for 1904, signed by Mr. E. L. Brockman as acting colonial secretary, was recently laid before the Legislative Council. The trade of the year was not satisfactory. Imported merchandise stated in dollars decreased by over 3½ per cent and exports by over 6 per cent, but when the total amounts are converted into sterling, there are increases of about 4¾ per cent and 2¼ per cent respectively, the average exchange being advanced by more than 8½ per cent. The total value of trade excluding movements between the Settlements, as expressed in dollars, was as follows: 1904.—Imports, $325,868,032 and exports $255,138,661, a total of $581,306,693 as against $610,005,948 in 1903.

WESTINGHOUSE ENGINES IN JAPAN.—During the years 1903 and 1904 Messrs. Takata & Co., agents for the Westinghouse Machine Company in Japan, have sold no less than 56 Westinghouse engines, ranging from 600 h. p. down to 12½ h. p., and aggregating in capacity about 8,000 h. p. They are all of the vertical single-acting type, both simple and compound. The list of customers comprises government arsenals, railroads, electric light companies, bureaus, waterworks, mines, universities and hospitals. Among the most important orders were for the Akabane Arsenal, 1,950 h. p.; Kure and Tokyo Arsenals, 1,628 h. p.; Kiushiu and Nippon Railways, 579 h. p.; Yokoska Arsenal, 547 h. p.; Fukagawa and Tokyo Electric Light Companies, 450 h. p.; Mr. Furukawa's Western Bureau 1,265 h. p.; Tokyo Imperial University, 93 h. p.; Yokohama Electric Wire Works, 62 h. p.; and Tokyo Waterworks, 31 h. p.

WEAVING INDUSTRY JAPAN.—According to investigations there are now at work in the Japanese mills 6 443 power looms, against 5,085 in December last, and 4,891 last June, making an increase of nearly 30 per cent in the 12 months. In addition, 1,456 looms are being put up, and 936 more have been ordered, so that by the end of the year the total will be 8,835, nearly double what it was last year. There are other mills now being erected or projected not included in the above, which will probably bring up the total to 10,000 looms. Last year, with 4,891 looms in operation, the output was 80,947,000 yds. and the consumption of cotton 62,000 bales. With 10,000 looms in operation the output may be expected to rise to 170,000,000 yds. and the consumption of cotton to increase at the same rate. Although the war demand has contributed somewhat to the expansion of the industry, according to *The Yokohama Chamber of Commerce at Work*, even greater prosperity awaits it after the war with the opening and colonization of Korea and Manchuria.

ICE FACTORY, CANTON, CHINA.—The long-talked-of ice factory at Canton, China, seems at last to be within reasonable distance, and by the next hot season the Cantonites will be revelling in all the joys which it is possible to extract from a few pounds of ice on a hot day. After many delays, much trouble and disappointment, the clouds which have hitherto enveloped the promoters of this enterprise have apparently vanished and all is now clear sailing. The contract for the erection of the plant has been given to the Oriental Construction Company of Hongkong, Shanghai and Manila, which company, it is understood, expects to have the plant completed by August, 1906, and the stock of the enterprise has been eagerly accepted by the public since it was found that the project is now going to be pushed through to completion. It is believed Canton will prove a fine field for this industry, with a population of 2,000,000 people and another 1,000,000 scattered throughout neighboring towns, not counting the numerous foreigners who reside in the vicinity. With one railway line in operation and several more projected the city will become a considerable railway center soon, and an increased impetus will be given to all branches of trade.

STEEL WORKS, JAPAN.—An important feature of 1904 is the increasing production in Japan due to the Imperial Steel Works at Wakamatsu. Rails, bars, angles and plates are now being turned out in quantities by these works, while machinery is being ordered for the production of telegraph wire, rivets, bolts, nuts, etc. At present the whole of the production goes to meet government requirements, but in the near future the importers will find a serious competitor in this establishment. It may safely be said that but for the war most of the rails imported during the past year would have been manufactured in Japan at the Imperial Steel Works. Figures are not available, but it is known for certain that about 18,000 tons of 60-lb. rails were manufactured there for use in building the military lines in Korea, besides many thousand tons of lighter rails. The United Kingdom's share of the rail import to Japan is reduced to 10 per cent., the largest share in the trade falling to America. British prices have been higher than those of other countries, and besides this, British steamers have on certain occasions refused to carry railway material. Belgium and Germany have supplied several lots of tramway rails, a speciality not obtained in the United Kingdom.—*British Consular Report*.

FINANCIAL NEWS.

SHANGHAI LAND INVESTMENT COMPANY, LTD.—This company has just declared a dividend of Tls. 3 per share.

KOREAN LOAN IN JAPAN.—A Korean 7 per cent loan of -Y-2,000 000 is to be issued at 95 in Japan by the Daiichi Ginko.

CHINESE ENGINEERING AND MINING COMPANY.—This concern has just declared an interim dividend of 1 shilling per share (Coupon 4.).

HONGKONG AND WHAMPOA DOCK COMPANY, LTD., HONGKONG.—This concern intends to pay an interim dividend of $6 per share=12 per cent.

BANKS IN JAPAN.—There were 2,257 native banks, with a capital of -Y-524,529,119, and six foreign banks with -Y-4,114,450, in Japan, on the first day of June last.

CHINA FLOUR MILLS COMPANY, LTD, SHANGHAI.—An interim dividend of Tls. 5 per share, equal to 10 per cent, for the half-year ended June 20th, has just been paid by this company.

MITSU BISHI BANK.—The report of the Mitsu Bishi Bank for the first half of 1905 shows a divisable balance of -Y-2,195.475. It is proposed to pay a dividend of 5 per cent, and carry forward the balance.

HONGKONG AND WHAMPOA DOCK COMPANY, LTD.—Subject to audit, the directors of this company will declare a dividend at the forthcoming meeting of 12 per cent, equal to $6 per share, and carry forward about $500,000.

AUSTRALIAN RAUB GOLD MINING COMPANY, LTD., F. M. S.—The balance sheet and accounts of this company for the year ended March 31st, 1905, show a balance of £8,745 in the treasury, after liquidating all obligations.

UNITED ASBESTOS ORIENTAL AGENCY, LTD., HONGKONG.—The balance at the credit of profit and loss account for the year ended May 31st, 1905, is $14,451.41. The company pays a dividend of 20 per cent on ordinary shares.

COTTON MILLS AMALGAMATION, JAPAN.—The Miye, Nagoya and Owari cotton mills have decided to amalgamate and the latter two companies have requested the Nagoya Stock exchange to suspend transactions in their shares on the exchange.

MOVEMENTS OF SPECIE, JAPAN.—As to the movements of specie at Yokohama, Kobe, Osaka and Nagasaki, during the first half of the current year, they were as follows:—*Exports*—Gold, Y 6,417,000; silver, -Y-430,000. *Imports*—Gold, -Y-16,756,000; silver, -Y-6,119,000. *Total* -Y-22,875,000. *Excess of Imports* Gold, -Y-10,339,000; silver, -Y-5,689,000. *Total* -Y-16,128,000.

TOKYO SEIKO KAISHA.—At a recent general meeting of the Tokyo Steel Foundry, the following balance sheet was passed:—Net profit, -Y-108,243,413; balance brought forward, -Y-19,270,308; total, -Y 127,513,721. To reserves, -Y-45 000,000; to special reserves, -Y-15 000,000; to dividends (20 per cent per annum,) -Y-45,000,000; carried forward, -Y-21,731,721.

NETHERLANDS TRADING SOCIETY.—The general balance sheet and profit and loss account of the Nederlandsche Handel-Maatschappij, for 1904, show that, after deducting current expenses, writing off bad debts, and with the addition of the balance brought forward from 1903, the net profits amount to f5,081,876.14, out of which a dividend of 11 per cent has been declared.

HONGKONG ELECTRIC COMPANY, LTD.—This company is now operating upwards of 34,500 lamps of 8 c. p., 85 arc lamps and 15 lifts, against last year 27,500 lamps of 8 c. p., 85 arc lamps and 12 lifts. Its earnings have increased correspondingly, the balance of profit and loss account amounting to $112,199.88 against $99,969.77 last year. A dividend of 10 per cent has been declared.

MANILA RAILWAY COMPANY, LTD.—Coupons of the Manila Railway Company, Ltd., 6 per cent "secured notes," due on June 30th, are being paid at the office of the London and County Banking Company, Ltd., and the coupons of the 6 per cent prior lien mortgage bonds, Series "A" and "B," due July 1st, are also being paid by the same financial corporation at its offices, 43 New Broad-st, London, E. C.

GEO. FENWICK & CO., LTD, HONGKONG.—Over, 5,000 of the new shares in Geo. Fenwick & Co., Ltd., engineers, etc., were subscribed for by July 1st last, the issue consisting of 6,000 shares, *viz*, doubling the capital stock. The large number of shareholders resident in Europe and elsewhere accounts for the balance not yet having been applied for, as the company has not as yet offered them to the public.

TOKYO STREET RAILWAY COMPANY.—At the general meeting of this corporation, recently held in Tokyo, the following accounts were submitted:—Net profit, -Y-458,016,452; balance brought forward, -Y-2,042,617; total, -Y-460,059,069. To reserves, -Y-22,900,820; to special reserves, -Y-22,900,820; to first dividend, -Y-210,000,000; to Tokyo City, -Y-67,404,901; to directors' and auditors' fees, -Y-15,000,000; to second dividend, -Y-121,200,000; carried forward, -Y-652,480.

SHANGHAI LIFE INSURANCE COMPANY, LTD.—The business of this company thus far this year gives promise of flattering results by the end of 1905. At the first ordinary general meeting of shareholders recently held in Shanghai the chairman announced that in the past four months applications had been received for insurance amounting to Tls. 361,000 of which sum Tls. 337,510 had been accepted and Tls. 23,500 had been declined.

HONGKONG ELECTRIC COMPANY, LTD.—The report of the board of directors to the sixteenth ordinary annual meeting of this concern gives a statement of the company's account for the year ended April 30th, 1905. The balance at credit of profit and loss account is $112,199.88; after deducting directors' fees ($3,000), there remains the sum of $109,199.88, and the directors recommended that this be disposed of as follows:—To pay a dividend of 10 per cent, $1 per share on 30,000 fully paid shares, $30,000, and 50 cents per share on 30,000 part paid shares, $45,000; to write off plant account for depreciation, $62,084.76; to carry forward to current account, $2,151.12.

FAR EASTERN STOCKS AND QUOTATIONS

COURTESY OF BENJAMIN, KELLY & POTTS, SHAREBROKERS, HONGKONG, August, 1905.

STOCKS	WHEN ESTAB-LISHED	CAPITAL	NO. OF SHARES	VALUE	PAID UP	RESERVE	AT WORKING ACCOUNT	DATE	LAST DIVIDEND	WHEN PAID	Approximate Return at Present Quotation*	CLOSING QUOTATIONS
											PER CENT	
Banks.												
Hongkong and Shanghai Banking Corporation	1865	$10,000,000	80,000	$125	$125	*g* £1,000,000 *s* $8,000,000 *i* $250,000	... $1,493,408	31-12-04	£1 10/. and bonus £1 @ exchange 1/11 9-16=$25.46 for second half year 1904	20-2-05	5%	$915 London £90
National Bank of China, Limited	1891	£699,475	99,925	£7	£5	$200,000	.....$41,768	31-12-04	$2 (London 3/6) for 1903	1-2-04	—	$38 buyers
Marine Insurances.												
Canton Insurance Office, Limited	1881	$2,500,000	10,000	$250	$50	$1,400,000 *j* $81,739	..... $150,494	31-12-03	$17 for 1903	22-10-04	5¼%	$325 buyers
China Traders' Insurance Co., Ld.	1865	$2,000,000	24,000	$83.33	$25	$950,000 *f* $151,992 *j* $362,366 *u* $371,445	..... Nil.	30-4-04	$4½ for year ended 30-4-1904	8-12-04	6%	$74
North China Insurance Co., Ld.	1863	£150,000	10,000	£15	£5	T800,000	..... T217,119	30-6-04	Interim of 7/6 for 1905	1-5-05	8%	T82
Union Insurance Society of Canton, Limited	1867	$2,500,000	10,000	$250	$100	*s* $1,850,000 *g* £20,000 *f* $372,749 *j* $893,110 *u* $846,773	.....$2,078,997	30-6-04	$35 for 1903	21-1 -04	5%	$725 buyers
Yangtsze Insurance Association, Ld.	1862	$800,000	8,000	$100	$60	$750,000 *j* $50,000 *f* $5,890	..... $599,364	31-12-04	$12 and $3 special dividend for 1903	12-4-05	8½%	$172½
Fire Insurances.												
China Fire Insurance Co., Ld.	1870	$2,000,000	20,000	$100	$20	$1,000,000 *x* $218,039 *f* $2,241	..... $260,374	31-12-04	$6 dividend and $1 bonus for 1903	10-3-05	8¼%	$85 sales
Hongkong Fire Insurance Co., Ld.	1868	$2,000,000	8,000	$250	$50	$1,200,505	..... $360,372	31-12-04	$34 for 1903	7-3-05	11¼%	$305
Shipping, Tug and Cargo Boats.												
China and Manila Steamship Co., Ld.	1882	$750,000	(*1*) 30,000	$25	$25	$5,000	$8,832	31-12-04	$1 for 1904	27-3-05	5%	$20 sellers
Douglas Steamship Co., Ld.	1883	$1,000,000	20,000	$50	$50	$185,000 *i* $85,439	..... Nil.	30-6 04	$2 for year ended 30-6-1904	29-9-04	5¾%	$35 sellers
Hongkong, Canton and Macao Steamboat Company, Ld.	1865	$1,200,000	80,000	$15	$15	*e* $250,000 *d* $600,000 *f* $158,444	.....$26,160	31-12-04	$1 for second half-year 1904	15-2-05	9½%	$26½
Indo-China Steam Navigation Company, Ld.	1882	£1,200,000	(*2*) 60,000	£10	£10	£120,000 *i* £241,150 *h* £3,999	..... £4,435	31-12-04	12/. @ 1/10 7-8=$6.29.51 for 1904	13-7-05	6¾%	$92 sellers
Shanghai Tug and Lighter Co., Ld. Do. Preference	1903	T1,500,000	200,000 100,000	T50	T50	*i* T25,000	..... T43,762	31-12-04	Final of Tls 2½ making Tls. 4½ / Tls. 1½ making Tls. 3½ for '04	1-3-05	7½% 7½%	T60 sellers T50 sellers
"Shell" Transport & Trading Co., Ld.	1898	£2,000,000	2,000,000	£1	£1	£400,000 *i* £4,116	..... £58,852	31-12-03	Interim of 1/. (Coupon No. 5) for '04	1-1-05	4½%	21/. sellers
"Star" Ferry Co., Ld	1898 1900	$200,000	10,000 10,000	$10 $10	$10 $5	$65,000 *i* $24,257	..... $929	30-4-05	$1.80 / $0.90 cents for year ended 30-4-05	29-5-05	5¼% 3½%	$34 sellers $26 sellers
Straits Steamship Co., Ld.	1890	$500,000	(*3*) 5,000	$100	$100	$400,000 *e* $21,075 *i* $230,153	.... $21,231	31-12-04	$10 for 1904	12-3-05	7%	$142
Taku Tug and Lighter Co., Ld.	—	T. T1,500,000	30,000	T. T50	T. T50	*e* T102,000 *d* T212,614	..... T6,190	31-12-04	T1¾ final making T3¼ for 1904	29-2-05	11%	T30
Refineries												
China Sugar Refining Company, Ld.	1878	$2,000,000	20,000	$100	$100	*e* $450,000	..... $42,812	31-12-04	Final of $15 making $20 for 1904	24-3-05	9¼%	$210 buyers
Luzon Sugar Refining Company, Ld.	1882	$700,000	7,000	$100	$100	none	*Dr.* $85,987	31-12-04	$3 for 1897	24-3-98	—	$29 sellers
Perak Sugar Cultivation Co., Ld.	—	T350,000	7,000	T50	T50	T100,000	..... T1,635	30-9-04	T2½ for year ending 30-9-04	17-12-04	3¾%	T70 sales
Mining.												
Chinese Engin'ring and Mining Co., Ld.	1901	£1,000,000	1,000,000	£1	£1	*q* £40,000	..... £7,820	29-2-04	Interim of 1/. (No. 4)	...-7-05	—	T8 sellers
Oriental Consolidated Mining Co., Ld.	1901	G.$5,000,000	*y* 500,000	G. $10	G. $10	none	G. $672,093	31-12-04	Interim of 50 cts. (gold) for '95 (No. 5)	11-7-05	5¾%	G. $17
Raub Australian Gold Mining Co., Ld.	1892	£200,000	150,000 50,000	£1 £1	18/10 £1	£4,873	*Dr.* £4,029	31-3-04	No. 12 of 1/.=48 cents	28-1-01	—	$6 sellers
ociété Francaise des Charbonnages du Tonkin	1888	F.4,000,000	16,000	F.250	F.250	*l* F307,740 *a* F1,529,652	..... F.87,333	31-12-03	Final of F.25, making F. 50 for 1903	1-9-04	—	$490

STOCKS	WHEN ESTAB-LISHED	CAPITAL	NO. OF SHARES	VALUE	PAID UP	RESERVE	AT WORKING ACCOUNT	DATE	LAST DIVIDEND	WHEN PAID	Approximate Return at Present Quotation*	CLOSING QUOTATIONS
											PER CENT	
Docks, Wharves and Godowns.												
Farnham, (S. C.) Boyd & Co., Ld.	1901	T5,520,000	55,200	T100	T100	T1,000,000	..T34,924	30-4-05	Final of T8 making T13 for 1904/05	24-6 05	9¼%	T142
Fenwick (Geo.,) & Company, Ld.	1889	$450,000	6,000	$25	$25	$70,000	$8,577	31-12-04	$3¾ for 1904	13-3-05	13 %	$29
	1905		z 12,000			$250 000			First year	—	—	$27 new issue
Hongkong and Kowloon Wharf and Godown Co., Ld.	1886	$2,000,000	40,000	$50	$50	q $58,423 i $10,000 w $300,000	$29,422	31-12-04	Final of $2½ making $5 for 1904	11-3-05	5¼%	$97½ buyers
Hongkong & Whampoa Dock Co., Ld.	1901	$2,500,000	50,000	$50	$50	i $33,500	$498,289	31-12-04	$6 div. & $1 bonus for 2nd ½ year '04	21-2-05	7¾%	$198 buyers
Howarth Erskine, Ld.	1901	$1,200,000	12,000	$100	$100	$60,000	—	30-6-04	$10 div. & $5 bonus for the year	... 8 04	5½%	$270 sellers
New Amoy Dock Co., Ld.	1892	$40,500	6,000	$6¾	$6¾	$55,500	$489	31-12-03	$1¼ for '03	5-5-04	7 %	$18 sellers
Riley Hargreaves & Co., Ld.	1899	$875,000	6,000	$100	$100	$150,000	$40,936	31-12-03	$10 div. and $2½ bonus for '03	7-3-04	5½%	$250
Do. (Preference)			2,750						$7 dividend		6¼%	$111½
Shanghai and Hongkew Wharf Co.	1902	T3,200,000	32,000	T100	T100	b T487,210 r T59,880	T10,711	31-12-04	Final of T6 making T10 for '04	30-3-05	5½%	T192½ sellers
Tanjong Pagar Dock Co., Ld.	1864	$3,700,000	37,000	$100	$100	$2,100,000	$206,645	31-12-04	$20 for second ½ year making $26 for '04	20-3-05	6¾%	$380 sales
Yangtsze Wharf and Godown Co., Ld.	1902	T250,000	2,500	T100	T100	T17,500	T2,762	31-12-05	T18 for '04	29-3-05	9¼%	T192½ buyers
Lands, Hotels and Buildings.												
Astor House Hotel Co., Ld. (Shanghai)	1901	$750,000	(4) 30,000	$25	$25	none	$9,989	30-6-04	$2½ for year ending 30-6-04	30-8-04	8 %	$31¼
Astor House Hotel, Ld. (Tientsin)	—	T. T100,000	2,000	T. T50	T. T50	T34,000 e T8,000	T806	29-2-05	Final of T5 making T9 for the year.	20-4-05	6¾%	T135 sales
Central Stores, Ld.	—	$91,845	6,000	$15	$12	$20,000	$1,502	31-12-04	Final of 60 cents making $1.80 for 04	30-3-05	10 %	$18 sales
Do. (Founders')			123	$15	$12				None	—	—	$100
Do. (New Issue)	1904	$360,000	24,000	$15	$7½				Preferential of 7% for '04	30-3-05	7 %	$7½ sales
Hongkong Hotel Co., Ld.	1866	$600,000	12,000	$50	$50	$100,000 r $10,000	$3,554	31-12-04	$5 for 2nd half-year making $10 for '04	30-3-05	7¼%	$138 buyers
Hongkong Land Investment and Agency Co., Ld.	1889	$5,000,000	50,000	$100	$100	e $250,000	$37,875	31-12-04	Final of $6 making $12 for '04	31-1-05	5¾%	$120 buyers
Hotel des Colonies Co., Ld. (Shanghai)	1902	T225,000	9,000	T25	T25	n T20,986	T7,202	31-3-05	T2½ for the year ending 31-3-05	18-5-05	13 %	T19
Hotel Metropole Company, Limited	1904	$200,000	2,000	$100	$100	—	First	year	Interim of $4	26 1-05	...	$105
Humphreys' Estate & Finance Co., Ld.	1887	$1,500,000	150,000	$10	$10	i $200,994 e $50,000	$11,958	31-12-04	90 cents for '04	11-2-05	7¼%	$12½
Kowloon Land and Building Co., Ld.	1889	$300,000	6,000	$50	$30	none	$377	31-12-04	$3 for '04	31-1-05	7½%	$40 sellers
Shanghai Land Investment Co., Ld.	1901	T2,600,000	52,000	T50	T50	T828,813 e T170,000	T40,066	31-12-04	Interim of T3 for '05	21-7-05	6¾%	T122 ex div.
Tientsin Hotel des Colonies, Ld.	1903	T70,000	1,400	T50	T50	none	T670	31-12-04	T5 for '04	1-3-05	10½%	T47 sellers
Tientsin Land Investment Co., Ld.	1902	T772,600	7,726	T100	T100	i T67,300	T725	31-12-04	T4 final making T7 for '04	29-2-05	5¾%	T120 sellers
Wei-hai-wei Land and Building Co., Ld.	1899	T91,850	3,764	T25	T25	none	T687	31-12-04	None	—	—	T12 buyers
West Point Building Co., Ld.	1889	$625,000	12,500	$50	$50	none	$1,247	31-12-04	Final of $1.70 making $3.20 for '04	31-1-05	6 %	$52 sales
Cotton Mills.												
Ewo Cotton Spinning and Weaving Co., Ld.	1895	T750,000	15,000	T50	T50	none	T12,844	31-10-04	T4 for year ended 31-10-03	22-12-03	8½%	T50 sales
Hongkong Cotton Spinning, Weaving and Dyeing Co., Ld.	1901	$1,250,000	125,000	$10	$10	none	$22,862	31-7-04	50 cents for year ended 31-7-04	12-9-04	3 %	$16½ sellers
International Cotton Manufacturing Co., Ld.	1895	T750,000	(5) 10,000	T75	T75	T50,000	T13,629	30-9-04	Interim of 3% a/c 1898	30-4-98	—	T45 sales
Laou-kung-mow Cotton Spinning & Weaving Co., Ld.	1895	T800,000	(6) 8,000	T100	T100	none	T10,000	31-12-04	Interim of 4% a/c 1898 on 6,000 shares	1-8-98	—	T52½ buyers
Soy Chee Cotton Spinning Co., Ld.	1895	T1,000,000	2,000	T500	T500	l T5,658	T22,051	31-12-04	4% for 1897	2-2-98	—	T160 buyers
Cigar and Tobacco Cos.												
Alhambra, Limited	1898	$60,000	300	$200	$200	none	*Dr.* $2,584	31-12-04	$125 for year ending 30-6-1900	15-8-01	—	$100
Philippine Company, Limited	1904	$675,000	67,500	$10	$10	—	—	—	First year	—	—	$9½ sellers
Shanghai-Sumatra Tobacco Co., Ld.	1902	T600,000	(7) 30,000	T20	T20	T24,820 v T25,000	T1,297	31-10-04	Final of T6 making T9	8-3-05	13½%	T68 sales
Miscellaneous.												
Anglo German Brewing Co., Ltd.	1905	$400,000	4,000	$100	$100	—	—	—	First year.	—	—	$118 sales
Bell's Asbestos Eastern Agency, Ld.	1895	£5,377.10s	8,604	12/6	12/6	£314	£770	31-12-04	1/3 per share for '04	21-7-05	12 %	$6¼ ex div.
Campbell, Moore & Co., Ld.	1886	$12,000	1,200	$10	$10	$8,000	$1,182	31-12-04	$3 for 1904	1-4-05	8¼%	$36
China-Borneo Co., Ld.	1903	$720,000	(8) 60,000	$12	$12	none	—	31-12-04	$1 for 1904	17-3-05	8½%	$11¾
China Flour Mill Co., Ld.	—	T200,000	4,000	T50	T50	T30,000	T718	31-12-04	T5 for 1904	24-3-05	8 %	T63½ sales
China Light and Power Co., Ld.	1901	$300,000	30,000	$10	$10	none	$3,739	29-2-04	None	—	—	$10
China Provident Loan and Mortgage Co., Ld.	1898	p $1,000,000	100,000	$10	$10	$80,000	$1,581	31-12-04	80 cents for 1904	18-1-05	9¼%	$8½ buyers
Dairy Farm Company, Ld.	1896	$187,500	25,000	$7½	$6	—	—	31-7-04	$1¼ for year ending 31-7-03	20-11-03	—	$17 sellers

STOCKS	WHEN ESTABLISHED	CAPITAL	NO. OF SHARES	VALUE	PAID UP	RESERVE	AT WORKING ACCOUNT	DATE	LAST DIVIDEND	WHEN PAID	Approximate Return at Present Quotation*	CLOSING QUOTATIONS
Miscellaneous.—Continued											PER CENT	
Fraser & Neave, Ld.	1898	$225,000	4,500	$50	$50	$112.500	..$2,706	31-12-03	$5 dividend and $2½ bonus for '03..	26-3-04	7½%	$100
Green Island Cement Co., Ld	1889	$1,500,000	150,000	$10	$10	w $400,000 / $500,000	..$95,054	31-12-04	$2 for 1904	27-2-05	7½%	$26½ sellers
Hall & Holtz, Ld.	—	$420,000	(9) 21,000	$20	$20	$186,000	..$7,551	29-2-05	Final of $1½ making $2½	15-4-05	9¼%	$27 sales
Hongkong and China Gas Co., Ld.	1864	£70,000	7,000	£10	£10	f £25,394 / £3,000	.. £8,188	31-12-04	Final of 6% & bonus of 1% making 22s. for 1904	25-5-05	7½%	$170 buyers
Hongkong Electric Co., Ld.	1889 / 1899	$600,000	30,000 / 30,000	$10 / $10	$10 / $5	none	..$2,151	30-4-05	$1.00 / 50 cents for year ending 30-4-05	17-7-05	6¼% / 4¾%	$16 ex div / $10 ex div
Hongkong High-Level Tramways Co., Ld.	1887	$125,000	1,250	$100	$100	$50,000	..$2,796	30-11-04	$15 for year ending 30-11-04	24-12-04	7 %	$212½ buyers
Hongkong Ice Company, Ld.	1881	$125,000	5,000	$25	$25	k $60,000	..$5.356	31-12-04	Final of $13 making $17 for 1904...	14-2-05	7 %	$242½ sellers
H'kong Rope Manufacturing Co., Ld.	1883	$500,000	10,000	$50	$50	$60,000	..$11,137	31-12-04	$10 for 1904	10-4-05	7 %	$152 buyers
Hongkong Steam Waterboat Co., Ld.	1900	$150,000	15,000	$10	$10	$2,500	.. $299	30-9-04	Interim of 50 cents for half year ended 31-3-1905	3-6-05	12½%	$15
Katz Brothers, Ld.	1896	$1,000,000	10,000	$100	$100	$475,000	..$3,400	31-12-04	$8 for 1904	...-3-05	6 %	$135 buyers
Lane, Crawford & Co., Ld. (Shanghai).	1903	$250,000	2,500	$100	$100	none	..$21,582	29-2-04	Interim of $5	19-11-04	7¼%	$145 buyers
Maatschappij tot Mijn-, Bosch- en Landbouwexploitatie in Langkat	1902	G.2,500,000	25,000	G.100	G.100	T528,210 / T19,465	..T35,849	31-10-04	2nd quarterly dividend of T5 making so far T12½ for '05 ...	15-6-05	19 %	T185 buyers
Maynard & Co., Ld	1901	$34,000	3,400	$10	$10	none	—	31-10-04	$2 for year ended 31-10-04	3-12-04	9 %	$23
Mondon, (E. L.) Ld	1902	T350,000	7,000	T50	T50	none	*Dr.* T117,638	31-12-04	T5 for 1902	2-5-03	—	T25
Moutrie (S.) & Company, Limited	1899	$200 000	4,000	$50	$50	$5,000	..... $832	30-6-04	Final of $3 making $5 for year ending 30-6-04	28-12-04	9 %	$54 sales
Shanghai and Hongkong Dyeing and Cleaning Co., Ld.	1903	$60,000	1,200	$50	$50	none	*Dr.* $5,537	31-8-04	None	—	—	$50
Shanghai Gas Co., Ld.	1903	T800,000	16,000	T50	T50	q T145,000 / T108,172	..T8,011	31-12-04	T3½ final and T1½ bonus making T8½ for '04	8-3-05	7 %	T122½ buyers
Shanghai Horse Bazaar Co., Ld.	1904	T270,000	5,400	T50	T50	T45,000	..T10,247	31-12-03	T3 for 1903	8-4-04	6 %	T80
Shanghai Pulp and Paper Co., Ld.	—	T450,000	4,500	T100	T100	T25,000	.. T6,968	31-12-04	Final of T8 making T14 for '04	28-2-05	8¼%	T167½
Shanghai Waterworks Co., Ld.	1881	£144,000	7,200	£20	£20	T170,000	..T17,220	31-12-04	Final of 37/6 making 52/6 for '04	6-4-04	4½%	T450 buyers
Singapore Dispensary, Ld.	1891	$30,000	600	$50	$50	$20,000	..$1,769	31-7-04	$6¼ for year ended 31-7-04	19-9-04	7¾%	$80 sellers
South China Morning Post, Ld.	1903	$150,000	6,000	$25	$25	none	*Dr.* $5,068	29-2-05	None	—	—	$21½
Steam Laundry Co., Ld.	1902 / 1904	$75,000	5,000 / 10,000	$5 / $5	$5 / $5	none	..$3,644	31-5-04	60 cents for year ended 31-5-04 / First year	2-8-04	7¾%	$8 buyers
Straits Ice Company, Ld.	1884	$200,000	2,000	$100	$100	$25,000	$700	31-12-04	$10 for second half year '04	—	—	$7½ buyers
Straits Trading Co., Ld.	1887	$2,500,000	250,000	$10	$10	$750.000	$84,813	30-9-04	$1 dividend and 35 cents bonus for half year ended 31-9-04	...-2-05	13¼%	$150 buyers
Tientsin Native City Waterworks Co., Ld.	1902	T356,000	3,560	T100	T100	e $50,000	..... T2,025	31-12-04	T2 for 2nd half year '03	9-12-04	6¾%	$41½ buyers
Tientsin Waterworks Co., Ld.	1901	T. T200,000	2,000	T. T100	T. T100	none	.....T1,012	30-4-05	Final of T4½ making T8½ for '03/5	9-3-04	—	T. T100
United Asbestos Oriental Agency, Ld.	1896	$100,000	9,900	$10	$4	T15,259	.....	20-6-04	90 cents	9-3-04	—	T. T120
Do. do. (Founders')			100	$10	$10	e T$4,000 / $20,000	.....$480	31-5-04	$29.70 for year ended 31-5-04 ..	20-6-04	7 %	$9½ sellers
Watson (A. S.) & Co., Ld.	1886	$900,000	90,000	$10	$10	$300,000	$6,096	31-12-04	Final of 50 cents making $1 for '04.	6-8-04	9¼% / 16¾%	$180 buyers
William Powell, Ld.	1901	$120,000	12,000	$10	$10	e $25.000 / e $3.000	..... $588	30-6-04	Interim of 50 cents for year 1904/5.	29-5-05	8 %	$12½ buyers
										10-4-05	10½%	$11¾ sellers

LOANS AND DEBENTURES	AGENTS FOR THE LOAN	AMOUNT OF LOAN	PAR VALUE	OUT-STAND'G BONDS	WHEN PAYABLE.	CLOSING QUOTATIONS
Chinese Government, 7 per cent. Silver Loan 1886 E.	Hongkong Shanghai Bk. Cor.	T767,200	T250	1969	Mar. 31st & Sept. 30th each year until Mar. 31st, 1917.	par.
Hongkong Hotel Co., Ltd., 6% Mortgage Debentures of 1899‡		$500,000	$500	§ all	Half yearly, June 30th and December 31st	par.
Shanghai & Hongkew Wharf Company Ltd. 6% Debentures of 1902		T543,900	T100		Half yearly, June 30th and December 31st	T96
Astor House Hotel Co. Ltd. 8% Debentures of 1903		T500,000	T100		Half yearly, January 1st and July 1st	T105
Chinese Engineering & Mining Co., Ltd., 6% Debentures of 1902†		£500,000	¶	£480,000	Half yearly, June 30th and December 31st	par.
International Cotton Manufacturing Co. Ltd. 6% Debentures of 1901	Russo Chin. B.	T500,000	T100		Half yearly, March 31st and September 30th	par-

Plus accrued interest

a Amortisation Fund.
b Building Reserve Account.
c Capital Reserve Fund.
d Depreciation and Insurance Fund.
e Equalization of Dividend Fund.
f Exchange and Investment Fluctuation Account.
g Gold Reserve Fund
h Exchange Reserve Account.
i Insurance Fund.
j Reinsurance Fund.
k Contingencies Account
l Legal Reserve Fund.
m
n Sinking Fund.
o
p Authorized capital $2,000,000.
q Depreciation and Repair Fund.
r Repairs and Renewals Account.
s Silver Reserve Fund.
t
u Underwriting Suspense Account.
v Special Works Fund.
w Premium on New Issue.
x Extra Reserve Fund.
y 75,000 owned by the Company.
z 6,000 shares unissued.
1 5,725 shares unissued.
2 First issue of 60,000 of which 10,411 unallotted.
3 785 shares unissued.
4 7,600 shares unissued.
5 1,616 shares unallotted.
6 842 shares unallotted.
7 Only 13,000 shares issued.
8 14,000 shares unissued.
9 399 shares unissued.
* Based on last year's dividend.
§ 270 held by the Company.
¶ In certificates of £20 and £100
‡ Redeemable in 10 years, or at option of Company the Company giving 6 months' notice.
† Redeemable at par at rate of £10,000 per annum from 31st December, 1903 to 31st December, 1952.
Dr. Deficit.

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OFFICE OF THE MUNICIPAL BOARD

Manila, P. I., July 20, 1905.

Sealed **BIDS** or **PROPOSALS** will be received by the Secretary of the Municipal Board until 12 o'clock m. January 2, 1906, and thereupon opened, for the furnishing of materials for and the construction of a gravity water supply for the city of Manila, Philippine Islands.

The proposed work will consist of a masonry dam and inlet chamber; a steel pipe line forty-two inches in diameter and approximately ten and one-half miles long; a masonry conduit in tunnel and open cut about four and one-half miles long; a receiving and distributing reservoir; and the necessary gates, gatehouses, and appurtenances.

Specifications, general plans, and blank forms of proposal may be obtained at the office of the Secretary of the Municipal Board, Manila, P. I., or from the Chief of the Bureau of Insular Affairs, Washington, D. C.

Each bid shall be accompanied by a certified check for twenty thousand dollars ($20,000) as a guaranty that the bidder, if awarded the contract, will, after due notification, promptly enter into contract and furnish an acceptable bond in the sum of twenty (20) per cent of the sum total of contract price for the faithful performance of the work.

The right is reserved to reject any or all bids.

G. S. LANE,
Acting Secretary, Municipal Board.

J. F. CASE,
Chief Engineer, Department of Sewer and Waterworks Construction.

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OFFICE OF THE MUNICIPAL BOARD

Manila, August 1, 1905.

Sealed BIDS or PROPOSALS will be received until 12 m. January 12, 1906, for the construction of a system of sewers and appurtenances for the city of Manila, Philippine Islands.

The total length of sewers will be approximately 52 miles, of which 7.5 miles will be of brick and concrete sewer ranging in size from 4.75 feet in diameter to 2 by 3 feet egg-shaped and laid at depths from 12 to 20 feet below the surface; and 43 miles will be of pipe sewers, from 8-inches to 24-inches in diameter, laid at depths of from 5 to 18 feet.

In addition to this there will be one 42-inch cast-iron outfall pipe 6,500 feet in length laid below the bed of the harbor on a pile foundation; besides one double line of 24-inch flexible-joint cast-iron, 650 feet in length, crossing the Pasig River.

The above work will be let as one contract, and each proposal must be accompanied by a certified check for $50,000, drawn on a local bank, or a bond drawn for a like amount signed by a fidelity insurance company authorized to give such bonds in the Islands, and no bid shall be considered unless such check or bond accompany it.

A surety-company bond for an amount equal to 20 per cent of the gross amount of the contract will be required of the successful bidder

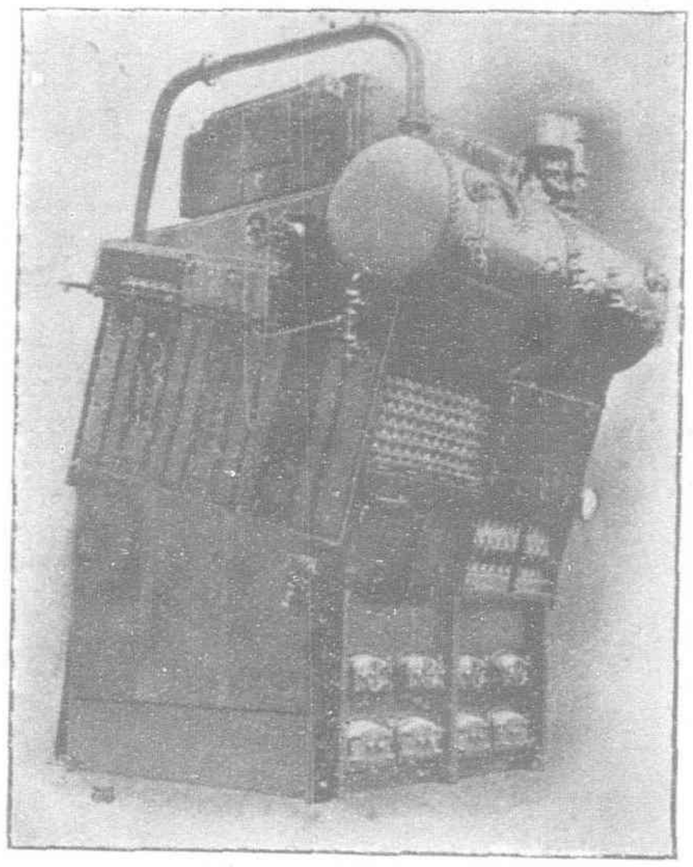
Specifications, general plans, and blank forms of proposals may be obtained at the office of the Board after August 1, 1905. Plans and specifications may be seen at the office of the Bureau of Insular Affairs, War Department, Washington, D. C.

The right is reserved to reject any or all bids.

G. S. LANE,
Acting Secretary, Municipal Board.

J. F. CASE,
Chief Engineer, Department of Sewer and Waterworks Construction.

N. B.—During the absence of Mr. David W. Bell in England, the representation of Messrs. BABCOCK & WILCOX will be carried on by POOLE, LAUDER & CO., No. 2 Yang-King-Pang, Shanghai; also at Tientsin and Hanhow.



MARINE TYPE FOR LAND PLANTS

Superheaters.
Feed-Water Heaters.
Economisers.
Steam Piping.
Steel Chimneys.
Water Purifiers and Softeners.
Coal-Conveying Machinery.
General Boiler-House Accessories.

Patent Chain Grate Mechanical Stokers

SMOKELESS COMBUSTION and **HIGH EFFICIENCY** with Bituminous Coal. Continuous Working, Low Cost of Upkeep, Self-Clinkering and Easy Manipulation.

Extract from 1904 Report of F. H. W. Aldridge, Municipal Electrical Engineer of Shanghai:

"It will be learnt with pleasure that the operation of the **MECHANICAL STOKERS** in the new Boiler (B. & W.) has so far successfully overcome the smoke nuisance. With this boiler working the emission of black smoke from the chimney shaft is entirely absent, only a thin white vapour at times being visible."

4,500,000 HP. IN USE

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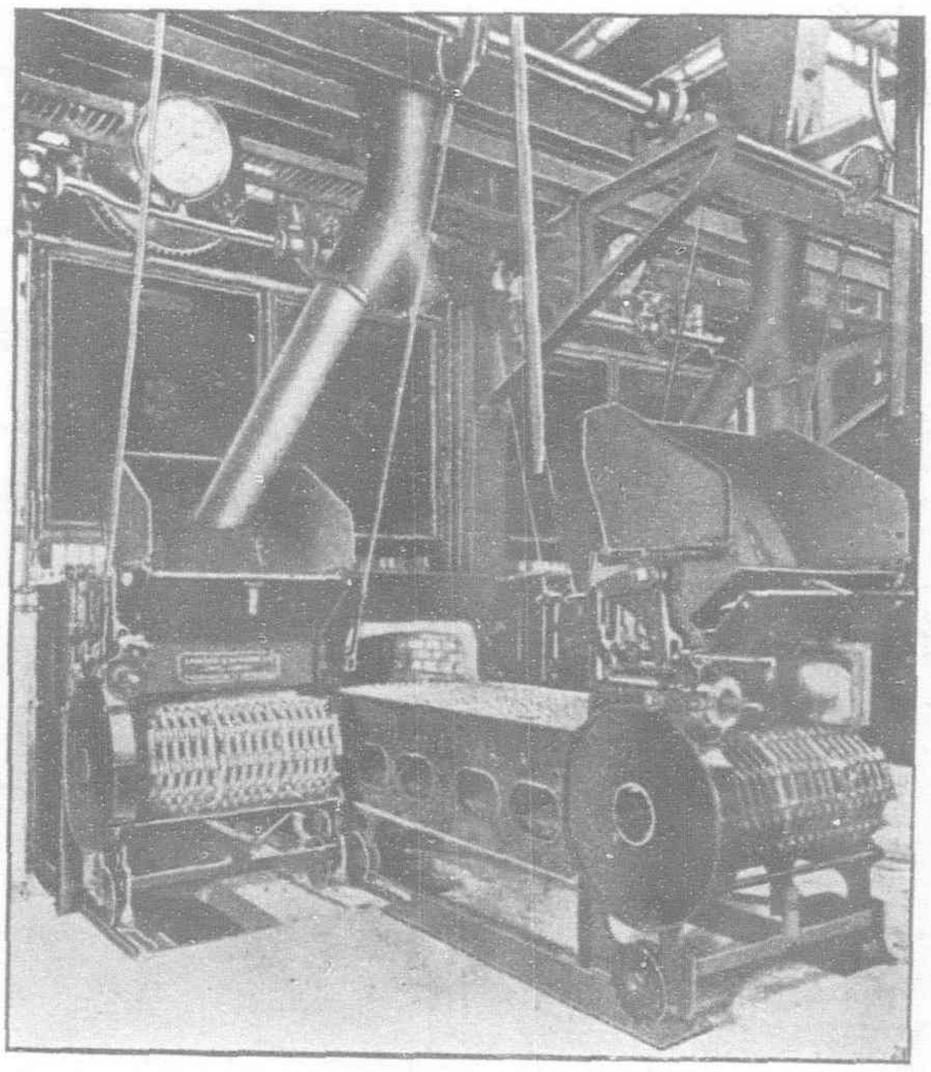
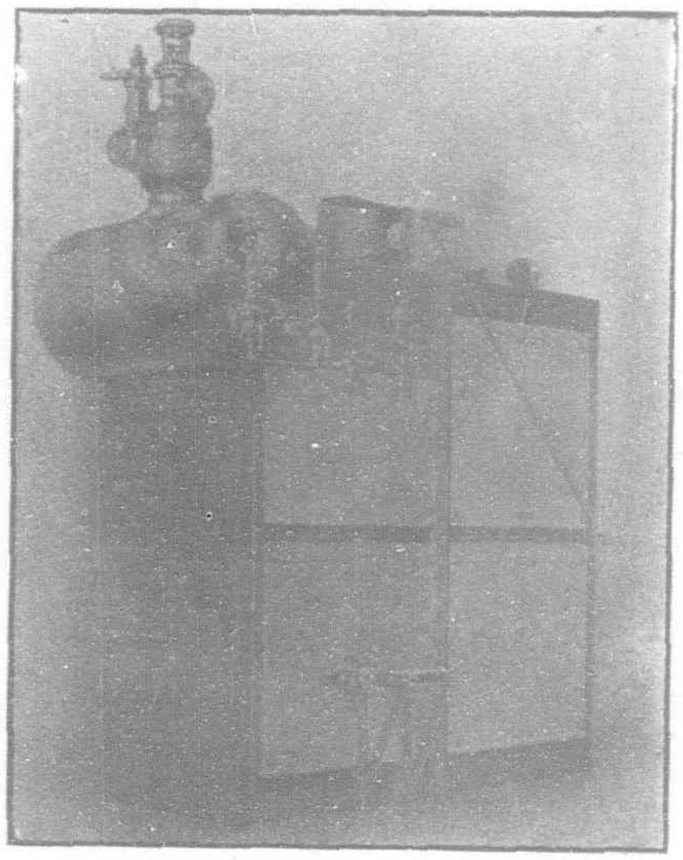
Patent Water-Tube Boilers



MANCHESTER CORPORATION ELECTRICITY WORKS, STUART STREET



PORTABLE TYPE, REAR VIEW

Patent Portable Boiler

Specially constructed for use in mountainous districts, and shipped in small packages of light weight, for easy transport by Cart, Coolies or Mule-back.

Marine Boilers

Specially suitable for light draught and river steamers, where economy in weight and space is of importance.

Marine Type For Land Purposes

Is frequently used in Electricity Works, and occupies less space for the horse power generated than their Standard Land Type Boiler.

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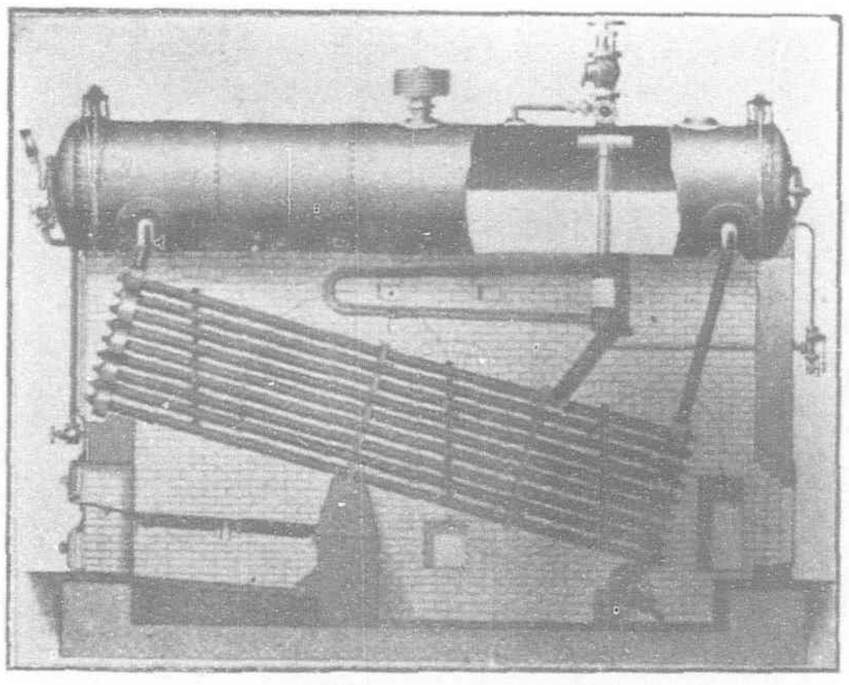
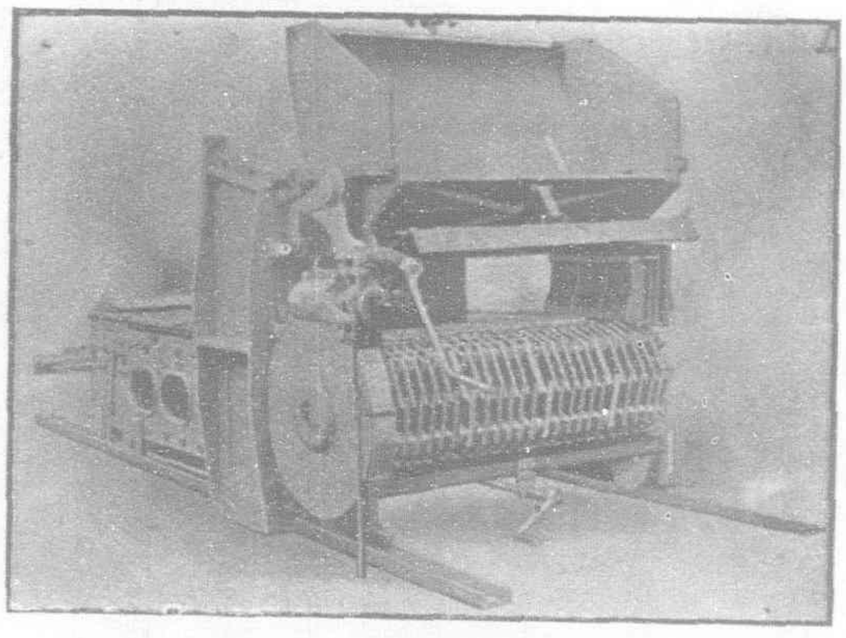
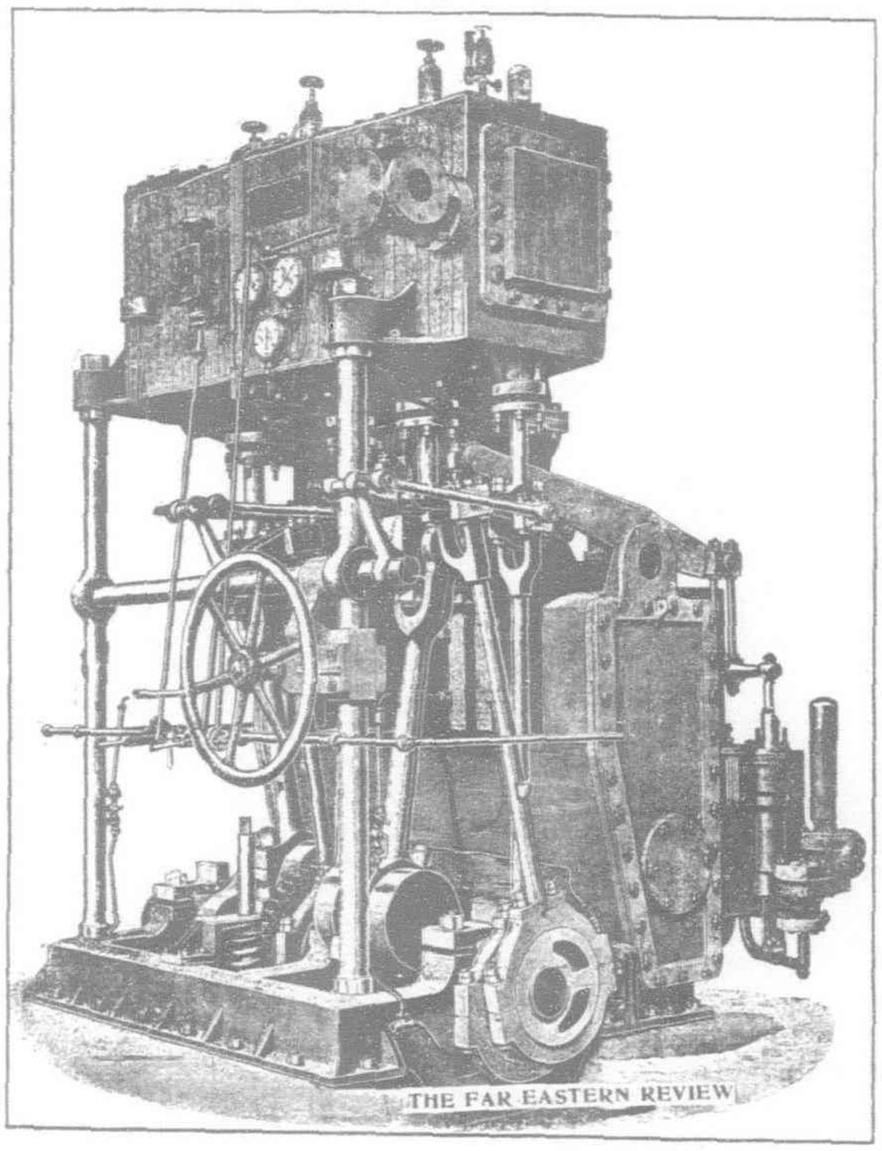


STANDARD LAND TYPE BOILER OF WHICH SOME 35,000 HAVE BEEN MADE



BABCOCK & WILCOX PATENT MECHANICAL CHAIN GRATE STOKER (WITH FIRE-DOOR OPEN)

Manuel Earnshaw & Co.



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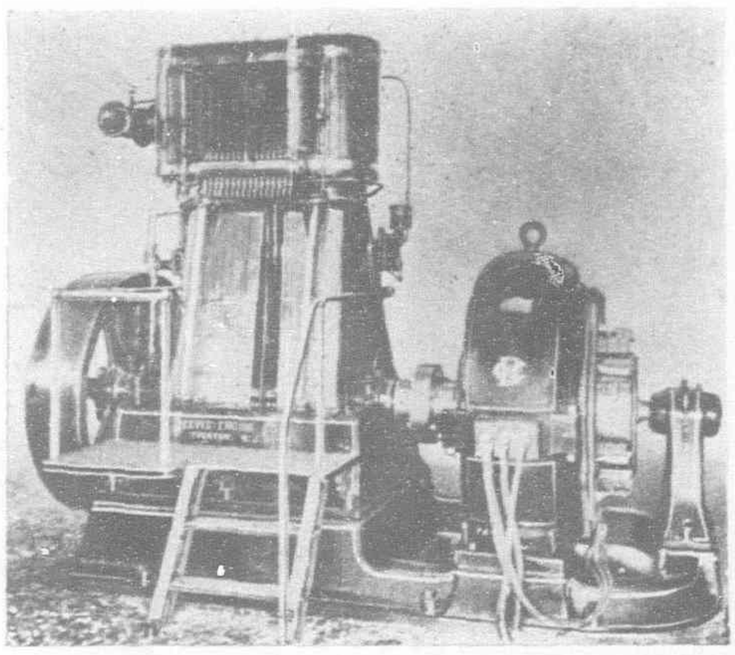

STEAM PLANTS FOR ALL INDUSTRIES

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